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AND

PHOTOGRAPHIC ENLARGER.

A Magazine of Popular Science for the Lecture-room and the Domestic Circle.

Edited by J. HAY TAYLOR.

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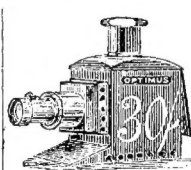
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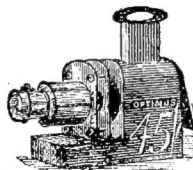
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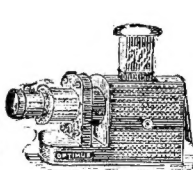
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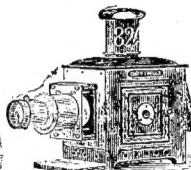
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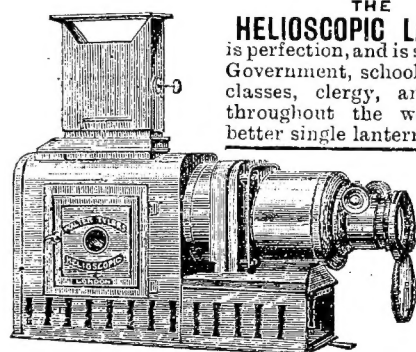
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Notes.

It is not an every-day occurrence for a steamer to knock a lighthouse down. Such, however, took place on the 18th ult. in Belfast Lough, when the boat ran into the structure, and carried it completely off its base.

* * *

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INHALING oxygen is being recommended in cases of pneumonia; it appears that some marvellous cures have lately been effected by this means.

* * *

FROM the 14th to 26th ult. Mr. D. W. Noakes, of Greenwich, delighted large audiences at the Crystal Palace with his entertainment, "Picturesque Rambles." The following subjects were of great interest:—"In Sight of Albion's Cliffs," "Round the Nore," "England bisected with a Steam Launch," "Channel Islands through my Camera," &c. Each subject was well illustrated by coloured photographic slides. At the termination of each lecture Mr. Locke gave a series of his startling dioramic effects. With two such past masters in the art as Messrs. Noakes and Locke it is no wonder that their entertainments draw immense audiences.

* * *

WE understand that Mr. W. I. Chadwick was the first person to suggest that the distance between the lantern and screen, with a given size of disc, and a given lens, could be ascertained by multiplying the diameter of disc required by the focus of lens, and then dividing by the diameter of slide. "A Continental Subscriber" writes us to say the principle, although

perhaps it will in most cases do, is not theoretically correct, and, to be so, the equivalent focus of the lens employed should be added to the result obtained by the above calculation.

* * *

A few days ago we were afforded a treat by Mr. Hill, the well known slide artist, of 13, Beversbrook Road, Tufnell Park, N. This gentleman showed us a number of lantern slides he had painted in the old Polytechnic days, at which time his firm (then Childe & Hill) painted most of the slides used at that Institution. Many sets of the present time were also shown to us; the sketches, which themselves were works of art, were made on the glass, and those in a completed state were of the highest class we have seen, being totally different to a coloured photographic slide.

* * *

THIS is the time of year when operators complain that the fog prevents their light from penetrating across a large hall; the best remedy in such a case is to bring the apparatus nearer to the screen, using a lens of suitable focus.

* * *

DURING some experiments with a Lucigen light of 9000 c. p. in a fog, it was ascertained that it could be seen at a distance of about 1000 feet.

* * *

A SMART bit of work was performed at the Hackney Photographic Exhibition on the 17th ult. Among the exhibits of apparatus, etc., were the Platinotype Company's new lamp for printing at night, and the Paget Prize Plate Company's new printing-out lantern plate. A negative of the worthy secretary was obtained, and with the above-mentioned articles a lantern slide was printed, and shown upon the screen, the whole operation not requiring more than two minutes.

* * *

WITH the present Number we end Volume III. of this Journal; the Index will be issued with the January Number. We take this opportunity of thanking correspondents in various parts of the world for their good wishes, which are continually pouring in upon us. It is gratifying to learn that we have such a wide circle of friends and supporters, and have pleasure in wishing our readers

A MERRY CHRISTMAS.

A number of first-class lantern exhibitions are to a great extent spoiled by the use of a bad signal for changing the slides.

ARTHUR K. DEARDEN.

I (at New York) was the first to adapt and introduce the bellows collapsible extension front for lanterns, applying it in 1876, but unfortunately did not patent this application, and it is now extensively used.

T. H. McALLISTER.

Old Coal Gas.

WHILST oxygen or (pure) hydrogen will keep for an indefinite period when compressed in cylinders, and when used at any distant time be found to act in a similar manner to gas of more recent manufacture and compression, coal gas appears to undergo a chemical change after being kept for a few months, to such an extent, as to render it quite unsuitable for practical purposes connected with the production of the lime-light.

We recently received from a well-known lanternist, a lime cylinder, which had been used in conjunction with coal gas which had been bottled for six months, and were supplied with particulars of its behaviour when used in the lantern.

Whilst the lime was new and clean, it was, with a blow-through jet, at once rendered incandescent; but in the space of a very short time the incandescent spot became less brilliant, whilst a red deposit appeared on the lime. This deposit speedily changed to black at the immediate point of the lime upon which the gas impinged. The red precipitate gradually enlarged over the surface of the lime followed by the black, and the lime became no longer incandescent to any great degree. What light that was obtained came by a series of jerks. After examination of the jet, it was found to be incrustated with a fine brown compressed powder, which could be readily removed. When the jet was cleaned, and the lime scraped, an ordinary light was again obtained for a short time.

Respecting the chemical action set up between the coal gas and the cylinder, we will not at present offer any explanation, as several scientists are at present engaged upon an investigation of the subject.

However, it may in the meantime be well to state how one may be able to ascertain if any particular cylinder of coal gas, which has been kept for a long time, has deteriorated, or that it will behave in a similar manner to that just mentioned. If the valve of a cylinder of old gas be slightly opened, and a light applied to the gas, the flame when turned down to about half an inch high, will exhibit four distinct cones of flame of slightly different colour, one being within the other, whilst, if the light be still further turned down, the central cone will rise above the others, and appear of a yellowish colour with smoke at the top.

It is impossible to make a perfect lantern condenser with less than three glasses. J. TRAILL TAYLOR.

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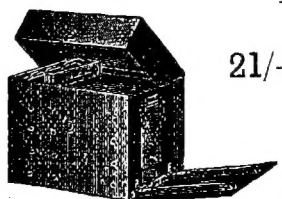
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OTHER TOWNS IN FUTURE ADVERTISEMENTS.

Centring the Light.

UNLESS the illuminant be exactly in the axis of the optical system of the lantern, and the correct distance from the condenser, the disc on the screen will not be evenly illuminated.

The appearance of the disc will at once indicate in what direction the light requires to be moved in order to get uniformity.

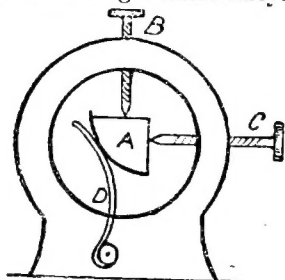


Fig. 1.

Thus, if a shadow be formed on the upper portion of the disc, the light must be moved downwards; if on the lower portion upwards; if at the right hand side, to left, whilst the light must be moved more to the right if the shadow be seen on

the left hand side of the disc.

Then, again, if the light be too near the condenser a bluish shadow will surround the disc.

Many people centre the lime-light in a moment without any special appliances for so doing, by merely liberating the clamping screw which secures the jet to the upright pin, supporting the jet by the hand until it is in correct position. On the other hand we have seen people experience great difficulty in getting a clear disc, the jet always seemed to move with a jerk, and after it was correctly adjusted sideways would perhaps slip down on the pin and upset the calculation.

It would appear that the lanternist of the present day likes to do all his adjustments by merely turning a knob, and there being a demand for jets which can be readily centred by this

Son, of St. John's Street Road, E.C. The jet was supported midway on a hinged joint upon which it could see-saw. The outer end of the jet beyond the inlet tubes for gas terminated in the form shown at A Fig. 1. A strong spring D, kept A tightly pressed against the points of the screws B and C. It will thus be evident, that if the light required raising or lowering, B had to be screwed or unscrewed, whilst a side swing could be imparted by manipulating C.

One was introduced by Mr. J. H. Steward, Fig. 2 in which the knob A, racked the jet up or down keeping it meanwhile quite horizontal. By turning B a swing motion is obtained by which the jet is moved to either side, whilst a forward or backward motion can be obtained by turning C. Should the lime not be at the precise distance from the nipple this is remedied by turning D. E turns the lime, and F actuates a cut off tap—whilst the whole apparatus after being in correct position as regards raising or lowering is clamped on the two uprights by GG.

Jets by other makers have been or are being introduced, by which the same effect may be obtained, although perhaps in a slightly different manner.

Messrs. Newton & Co., of Fleet Street, E.C., have just completed a model shown at Fig. 3. As will be observed the jet rests upon a stage, upon which it is clamped for rough adjustment, this stage is capable of having the finest adjustment imparted to it from behind, by the two milled heads shown at the left hand side—the longer of the two causing the stage with jet to be raised, keeping the jet meantime in a horizontal position.

By means of the shorter knob, the jet and stage can be moved sideways, thus keeping the nipple, lime and upright always in line with the optical axis.

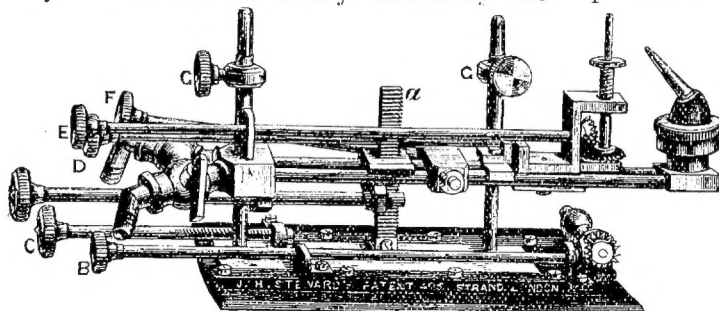


Fig. 2.

means, such have been introduced to meet this want.

The first jet capable of being centered from behind was the invention of Messrs. Ottway and

A jet has been patented by Mr. Abm. Kershaw of Leeds, which is about the same size as the ordinary commercial jet, can be fastened upon any jet-tray and yet be raised, lowered, or moved from side to side for centring purposes from behind.

The jet, after being roughly centred, is clamped to the upright of the tray by the usual screw A, The portion of the jet which fits on the upright is composed of two tubes, one of which can be turned. As A clamps the inner one to the upright, the outer is free to move, were it not kept in position by the screw B, which is fitted with a strong steel spiral spring.

By turning B either to the right or left the jet can be swung over to the right hand side, or

ordinary tray upright, whilst a few turns of the screw A, Fig. 5, slowly and smoothly raises or lowers the jet, keeping it meanwhile quite horizontal.

B is a pinion for turning the jet from side to side, the teeth of which are always engaged with a wheel contained on the jet frame, and which slides upwards or downwards in the pinion.

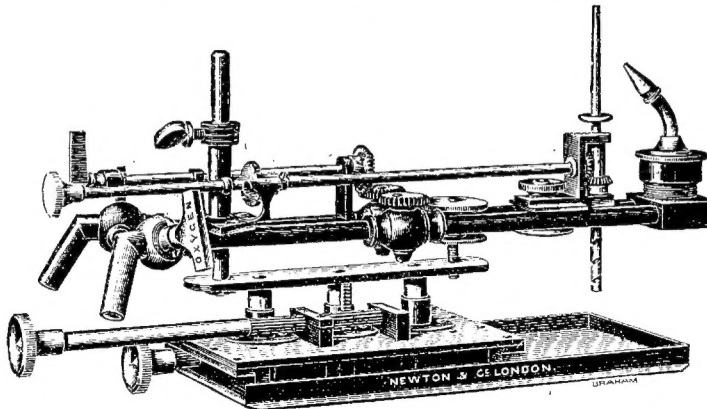


Fig. 3.

the left as desired—it having a play of $1\frac{1}{2}$ inches.

Behind the upright jet pin will be found a flat brass spring and a hinge. By turning the screw

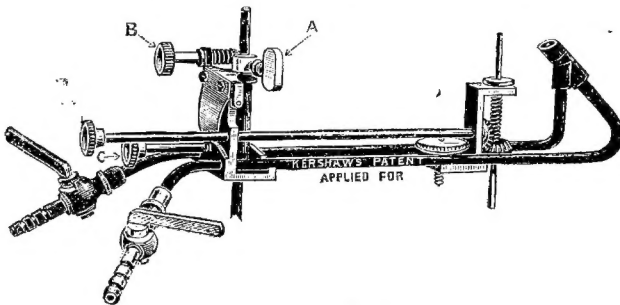


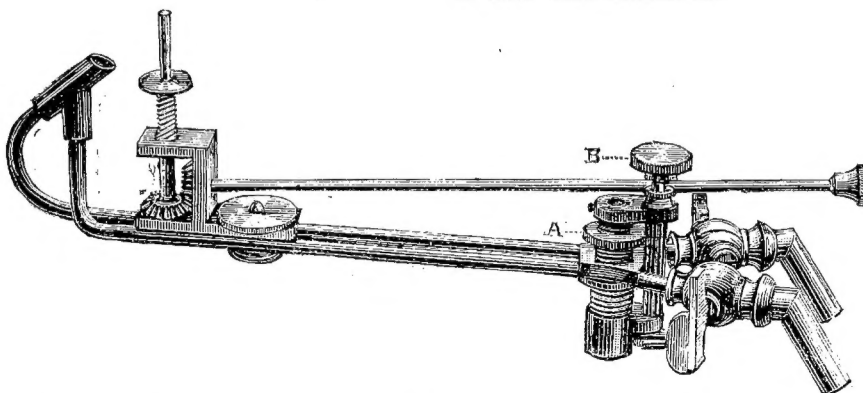
Fig. 4.

C, the jet can thus be raised or lowered to the extent of about an inch.

First Appearance of the Lantern at Guildhall.

THE new Lord Mayor of London recently sent out invitations to 2,000 scholars of the various Ward Schools to spend the evening with him at Guildhall, on the 11th ult., and needless to say they came in full force. They had expected to spend a quiet evening listening to a few addresses, but in this respect they were doomed to disappointment, for they were invited to various forms of amusements, including Punch and Judy shows, marionettes, conjuring, musical clowns, and a variety of other recreations. The hall seemed to be turned into a playground for the evening, and never before was such a scene witnessed within its walls.

Refreshment was provided on a huge scale, and we learn that 3,500 apples, as many buns, 300 gallons of lemonade, and nearly half a ton of cake were consumed.



Perhaps the latest jet on the "knob adjustment" principle is one for which a patent has just been applied for by Mr. A. Wrench. Like the foregoing, the jet is clamped to the

After the foregoing amusements were over, Mr. A. A. Wood, of Cheapside, with his assistants, appeared upon the scene, with a fine triple lantern. Whilst it was being put in

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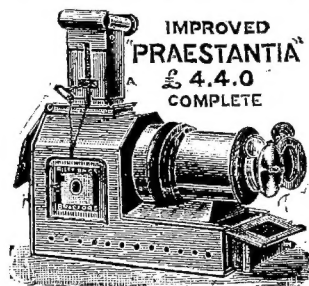
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readiness, many were the remarks made by the boys about the wonderful size of the instrument, how they supposed that the fronts "must be made of gold to shine so," and a hundred and one other boyish remarks.

The apparatus was speedily in readiness, and the story of the evening was "Dick Whittington," after which a large number of effect slides and comics were shown, and it is not too much to say that never before did a lanternist meet with such applause as did Mr. Wood on the occasion of this, the first appearance of the lantern at Guildhall. "It has been the privilege of every Lord Mayor in the past to entertain the brightest, the mightiest, and the best in the land, but it has not fallen to the lot of every Chief Magistrate to assemble around him hundreds of little children whose lives perhaps are not of the brightest. Thus has the Lord Mayor's reign commenced with a conspicuous success."

—:0:—

Stanley Cycle Show.

APPARATUS, &C. PHOTO DEPARTMENT.

On the 18th ult. the Stanley Show was opened by Sir Albert Kay Rollit, M.P., at the Agricultural Hall, Islington, N. Of all the previous fifteen annual shows of this club, this one, which terminated on the 26th ult., was by far the largest and most interesting.

Through the indefatigable efforts of Mr. Herbert Smith an extensive exhibition of photographs and apparatus was held in conjunction with it.

The awards of the Photographic Section were as follows:—

Gold Medals.—J. C. Kear, H. D. Arnott, J. Carpenter, F. Whaley.

Silver Medals.—Austin C. Edwards, A. R. Dresser, E. G. Lee, J. E. Austin, H. Baker.

Bronze.—W. H. Kitchen, H. D. Arnot, A. R. Dresser, Austin C. Edwards, C. F. Treble.

Diplomas.—Austin Edwards, A. R. Dresser, 2; A. S. Statham, E. Hawkins, J. E. Austin, J. H. Gear, J. O. Grant, W. Taylor, C. T. Treble, E. Benson, F. W. Edwards, W. J. Auckorn.

Among the Exhibitors of apparatus we find The City Sale and exchange Company, who had large stand, upon which everything connected with photograph and lantern apparatus was to be found.

Burnishers, cameras, tripods, and lanterns, and "flying" carriers filled the stand occupied by Lonsdale Brothers.

H. Park had on exhibition Major Bruno's new hand camera, cameras, and aluminium fittings.

A well-stocked stand of Wray's world renowned lantern and photographic lenses,

mounted both in brass and aluminium, attracted great attention.

The stand of stands in this department was that of Messrs. R. and J. Beck. Here was to be seen Frena hand cameras, Frena developing sets, Frena stands, Frena developing dishes and cabinets and Frena drying boards. Considerable interest was paid by visitors to a species of cruet stand, fitted with bottles of developers, also to bicycles fitted with Frena hand cameras.

The only stand at which workmen were employed in the making of apparatus was that of Smith and Co., who also showed the various apparatus, both in process of manufacture, and in a finished state.

The most effective display of lanterns was to be found at the stall of Platt and Witte, who exhibited, amongst others, lanterns fitted with a support for fronts. Also a biunial with bellows fronts and novel rack, the jet rested on rods connected with the front, and move in conjunction with same.

Morley and Cooper had a neat and effective display of apparatus, including the bi-trisingle lantern and "flying" carrier described in these pages a couple of months ago. A new hand camera, "The Cyclist," was shown on the stand occupied by Sands, Hunter and Co., as also were some fine cameras, shutters, &c.

Lantern slides, transparencies and negatives were shown on a handstone erection by B. J. Edwards and Co.

A novel and compact hand camera was shown by Miller and Co., which possessed many novel features.

A photographic enlargement from a whole plate negative, by Birt Acres, of Elliott and Son, was the object of an admiring crowd. It measured 7 feet long, by 5 feet high.

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New Apparatus.

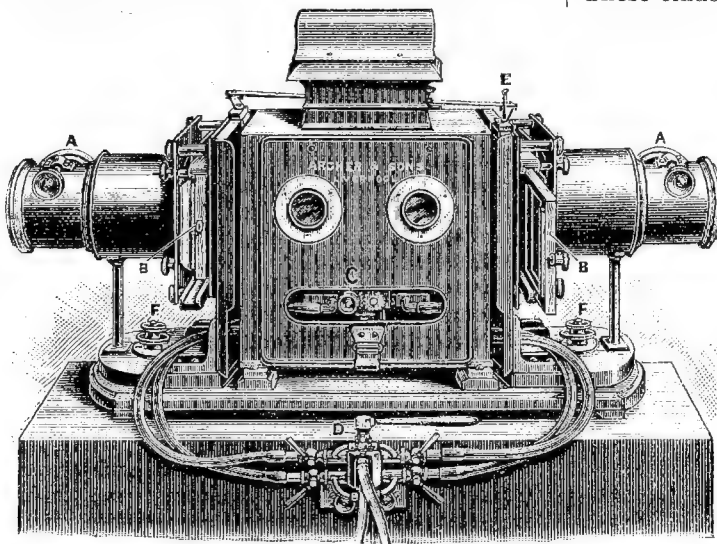
THE UNILUX LANTERN.

SOME time ago we made mention of the Unilux lantern which Messrs. Archer & Sons, of Liverpool, have been perfecting during the summer. It now being complete and on the market, we are enabled to let our readers see an illustration.

The operator stands at the back of the lantern, from which position he commands all the adjustments of this double lantern.

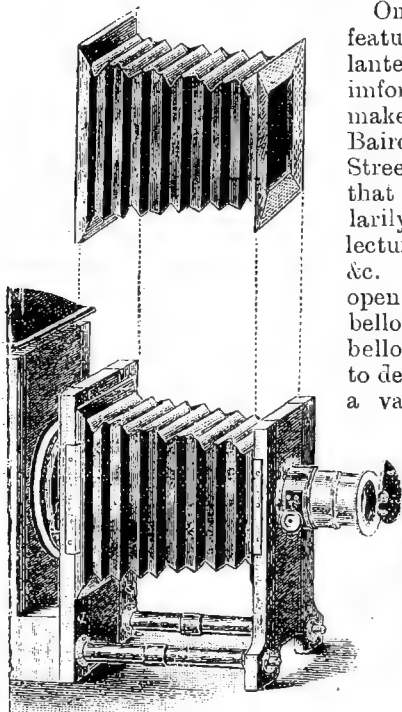
The lenses AA are of special construction, each being provided with a prism placed between two combinations which are set at right angles, so that the discs will coincide upon a screen facing the operator. The carriers are shown at BB. The light is situated at C. D is

the dissolver. E is a roller curtain effect which can be used either with oil or lime-light. By the adjustment of FF, the discs are caused to coincide upon the screen. The lantern has one



light, or rather we should say one lime, there being a jet on either side of the lime cylinder. This lantern is a novel departure from the stereotyped shape to which we have all become accustomed.

LOTHIAN LANTERN.



One of the chief features in this lantern, is, we are informed by the maker Mr. A. H. Baird, of Lothian Street, Edinburgh, that it is particularly adopted for lecturers, teachers &c. It has an open stage and bellows front. The bellows are made to detach, so that a variety of experiment of a scientific nature can be shown. No screws are required, the bellows being merely lifted out.

METAL SLIDE BINDERS.

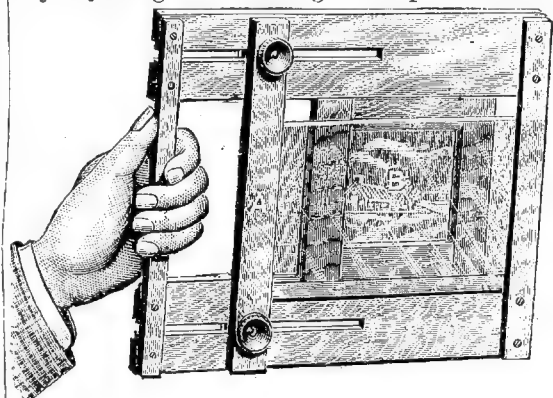
A box of these has reached us from the Photo Enterprise Co., 41, Erasmus Road, Birmingham. These binders are shaped so as to grip the edges of the slides. Slides can be quickly bound by using these binders, which are held in position by a tongue at one end inserted in a slot at the other extreme.

COMPACTUS LANTERNS.

In this lantern a light Russian iron screen is placed at the back of the chimney to screen the operator from heat. The lenses give great flatness of field. The condensers are ventilated. The sight-holes at side of lantern are placed in an unusual but most useful position, which enables the operator to inspect the reflection of flames or lime on the condensers, the chimney slides in four pieces and is packed under the chimney, the weight of the whole including lantern, lamp, chimney, screen and case, only 15 lbs. 2 oz. which the inventor, Mr. W. Stocks, of Rye, reminds us, is $2\frac{1}{2}$ lbs. less than Commander Gladstone's special aluminium lantern, referred to in last month's issue

LANTERN SLIDE PRINTING FRAME.

We have to acknowledge receipt from Mr. Wm. Tylar, of Birmingham, of a useful and neat printing frame for making lantern slides from portions of large negatives. The adjustments of this little apparatus can be made in a moment. The negative is laid on the frame and clamped by adjusting A. A sliding frame placed behind



is moved in guides until the desired portion of the negative is seen, this having been ascertained a lantern plate is placed in the frame B, and the whole exposed to light in the manner shown.

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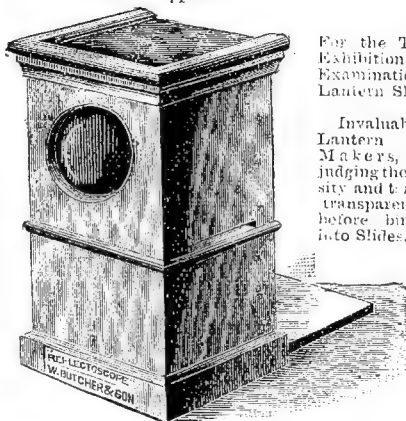
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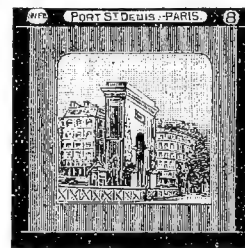


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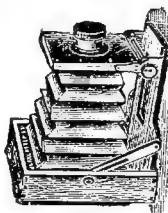
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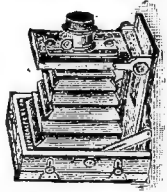
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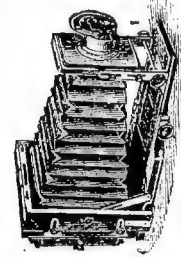
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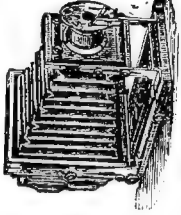
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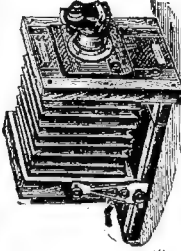
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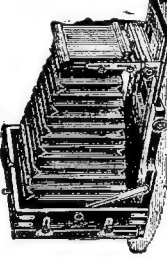
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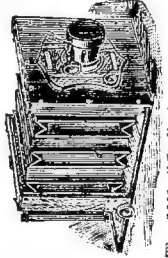
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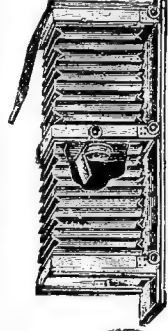
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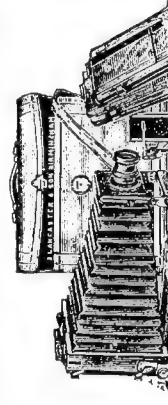
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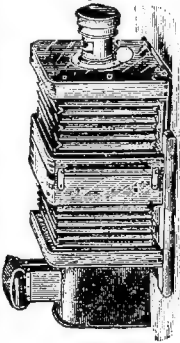
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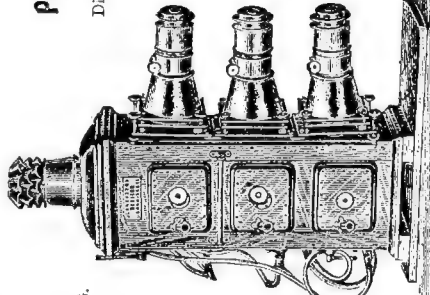
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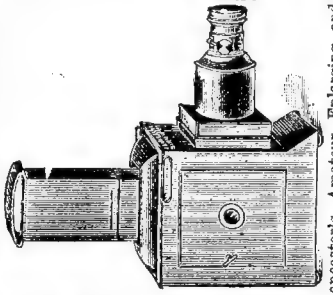
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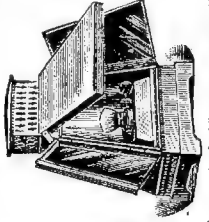
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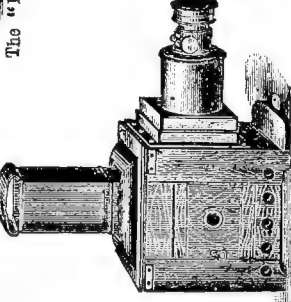
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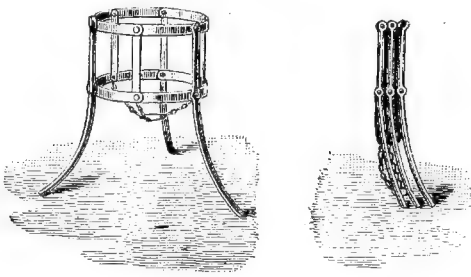


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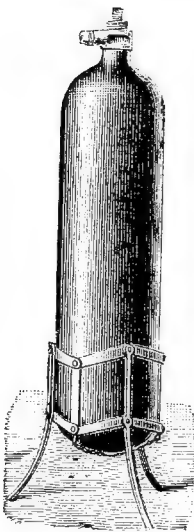
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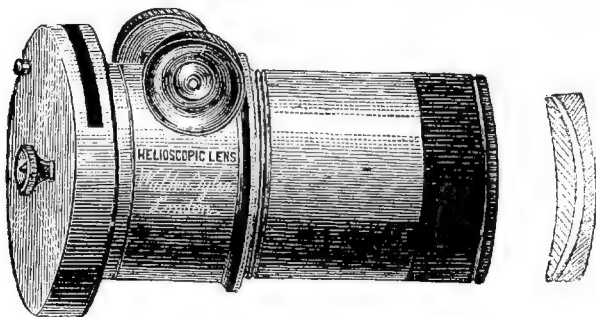


When describing (in our issue for October) some stands by which gas cylinder could be supported, we forgot to allude to one which was put upon the market by the Scotch and Irish Oxygen Company, Glasgow, and termed Briers patent stand for cylinders. The stand which is shown open and closed in Fig. 1 and 2 is put together with two loose links, which, when in use Fig. 3 become depressed and hold the bottle as in a vice.

For packing up, a link is unbuttoned and the stand folded into small space, these stands are made in various sizes and weigh, according to size, from 10 oz. to $2\frac{1}{2}$ lbs.

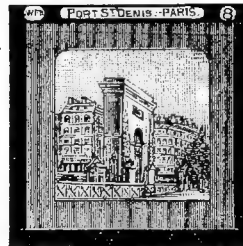
NEW LANTERN LENS, &C.

A good lens for lantern purposes should give flatness of field. Mr. Walter Tyler, of Waterloo Road, S.E., has sent us one he has just brought out, and which answers this purpose to an excellent degree. The back combination is of



the form advocated by Mr. Dallmeyer. This form is shown in the annexed cut.

COVER GLASS AND BINDER.



Messrs. Butcher and Sons, of Blackheath, are determined that their customers will have as little trouble as possible when preparing lantern slides. They supply cover glasses with one edge of the binder already secured to the glasses, so that one has merely to lay their transparency upon this, moisten the paper and bend it over, care being taken that the spots which are on the binder shown in the illustration are placed at the upper part of the picture.

—:O:—

Lantern versus a Glass of Beer.

By T. S. WALTERS.

I REMEMBER reading in the December, 1889, number of this journal, how the lantern lent its aid towards painting an enormous sign on the end of a house, and readers have in past numbers been treated to not only the scientific side of *lanternism*, but have from month to month been treated by the editor to a great variety of lantern subjects—and everything has been of a practical character.

Now, I do not intend to show how a lantern may be purchased in a given time by the sacrifice of the price of a glass of beer a day, but will merely in passing call attention that 2d. per day represents in a year the sum of about £3.

When I took up my pen, the subject I had in my mind was to this effect:—During the interval between the acts at a theatre, which will do us the most good, to go to the bar (as by custom established), or to enjoy seeing some good pictures? but to give a heading of this kind was quite out of the question, so I decided to curtail it as shown.

All who have been to a theatre—and who has not?—know that as soon as the drop curtain has descended at the conclusion of Act 1, 2, or 3, as the case may be, a large proportion of the audience decide that they will go out in the corridors "to see a man," as it is often termed, which in other words signifies to have a drink. It is quite reasonable that parties should partake of even a glass of beer occasionally, but it appears to me to be the men folks who, as a rule, go out between the acts. At a recent performance of four acts, I took particular notice, and ascertained that in many cases the same

individual went out each time. It is not my intention to say that this is wrong, but when some people go to the theatre they arrive at such a pitch of excitement, that the five or six minutes wait, whilst the scenery and stage furniture is being shifted, is very tedious, and the music and the picture upon the drop scene is not sufficient to keep them in their seats.

Instead of the usual form of drop curtain, why not have a plain white curtain, and during the interval project lantern slides of various kinds?

Immediately previous to the end of the act, the lantern operator could have the intimation conveyed to him by the stage manager per electric bell, to have his lantern in readiness, and so adjust matters that by the action of the roller curtain on the lantern as soon as the drop scene is being lowered the picture can be rolled on.

In order to effectively give the names of the views, a bi-unial lantern is preferable. In this case the name of the picture with a few explanatory words could be written on a separate slide, the picture itself being placed in, say, the lower lantern, and the name in the upper. The picture having remained upon the screen for four or five seconds, the upper lantern containing the name slide should be flashed on, and after time has been given to read, the picture in the lower lantern is again flashed on and left for about half a minute. This arrangement will be found to be more satisfactory than showing first the name and then the picture.

The exhibition of the picture for a few seconds previous to giving the name, gives a special interest by allowing the audience the opportunity of recognising it.

With a promiscuous audience, tinted photographs are better than plain photographs. Photographs of statuary should, however, be left plain.

If the management think that such an exhibition would detract from the profits of the bar, then every second picture might be an advertisement slide, for which good prices could be obtained, and thus offset the profits which would have been obtained for beer.

The best position for the lantern would of course be the centre of the first balcony, but in places where the theatre or hall is not provided with such, there is no reason why the lantern should not be placed on a small platform suspended and kept in position by wires after the fashion of an acrobatic platform. In this case the bottles could be stationed on the floor below, and a rubber pipe brought to the platform.

With reference to this platform, which should of course have a safety rail around it, it might

be said that it would be somewhat monotonous for the lantern operator to remain perched up there. This might certainly be a new experience for most lantern operators, but as soon as the novelty wore off, it would be considered "a matter of course," and attended without any danger. But I fail to see why the operator could not be pulled up to his platform by a rope a few minutes prior to the end of an act, and descend again in the same manner as soon as the next scene commenced.

The usual music could of course be performed during the time the pictures are being projected, and thus add to the general interest of the programme.

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How to Renovate a Lantern.

No. 4.—DULL BLACK SURFACES.

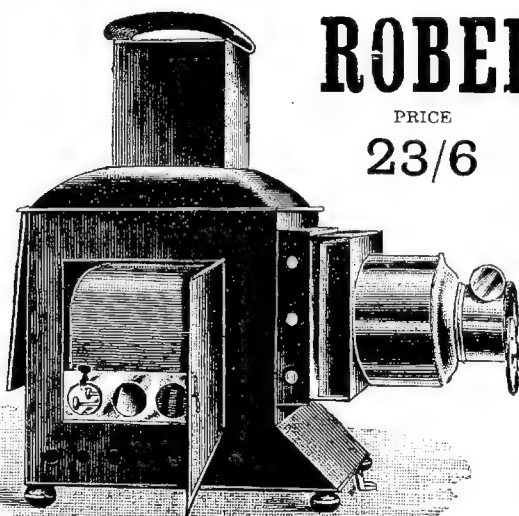
By C. GOODWIN NORTON.

THERE are many parts of a lantern and camera which require to be painted or coated with a dull black, so as to avoid any false light being projected on the screen from one or more reflecting surfaces.

In the case of rendering dull black parts which are not likely to be touched—such as the fixed stop in an objective—they may readily be coated with a black deposit by holding them in the smoke produced by burning a piece of camphor. It will, however, be obvious that this can only be done in exceptional cases, as the smoke and heat may injure the surrounding parts which are not required to be blackened. For blacking a piece of glass upon which to make a sketch for a lantern this is an excellent method, especially if the glass has been previously rubbed over with a little bees-wax, which causes the black to adhere well.

A good dull black varnish, which will adhere to almost anything, may be made by mixing together vegetable black or gas black and lacquer or French polish. The exact proportions can be easily ascertained by actual trial—too much polish or lacquer producing a gloss, whereas too little will fail to make the black adhere. The addition of a small quantity of methylated spirit gives a still duller surface, but it is more liable to rub off.

It is essential that the mixture be smooth and free from lumps; success can be ensured in this direction if two or three buckshot be placed in the bottle with the ingredient, and the whole well shaken each time before use. The bottle should be kept well corked. It is well to keep this mixture in a stone bottle (ink bottle will do), for glass bottles are usually thin at the shoulders, and the rattling of the shot may cause them to



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 Punch and Judy.
 Poor Jerimi.
 Curfew must not ring to-night.
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 Dogs and Monks of St. Bernard.
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 Old London and Our Ancestors.
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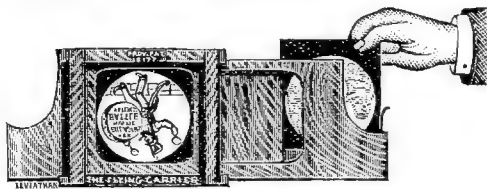
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break at this part, and the contents spread broadcast, in which case serious damage may be done, for the stain produced by it on any materials is exceedingly difficult of removal.

This mixture dries very quickly, so when applying it, it should be rapidly done with a soft brush, or marks and ridges may be formed. If necessary, several coats may be applied to the same article, letting each dry before another is applied.

Brass may be chemically stained in several ways, but perhaps the best and easiest method is first to thoroughly clean the article, then to dip into strong acid to ensure that every partial of grease has been removed, and to insert it in a saturated solution of hyposulphate of soda, to which has been added a little acetate of lead. In a short time the brass will become quite black with a dull surface. If it is required to be lacquered it should then be blackleaded and polished in exactly the same manner as a housemaid polishes a grate or fender, and the brushes used for the purpose are the very thing required.

(To be continued.)

—:0:—

Common Fallacies in Gas Services to Lanterns.—No. 2.

By D. W. NOAKE, GREENWICH.

My little article "Fallacies in the gas services to Lanterns," appearing in last month's journal, has brought several letters of thanks and commendation, and also various queries from all quarters, and some expressions of doubt, which go to prove how popular the *Optical Magic Lantern Journal* has become throughout the two small islands which the Americans say are to be found somewhere off the coast of France.

A printer's error occurs in the paragraph. Another fallacy also seems to exist, that a faulty governor passing more gas than it consumes can be corrected by putting a cork in the outlet, this should read "cock" on the outlet, and this correction will I think explain the queries put by some.

I have also been asked for further information in regard to my remarks that flexible tubing should not be wired or tied on to the brass connections.

I remember on one occasion having to work a lantern, the tube connections of which were not only of various colors and different bores; but all securely tied on the brass connections—the governor on the oxygen cylinder was also in a bad way, and would not shut down, but allowed the pressure to creep up in the flexible tubes,

one of which burst and struck me forcibly in the face, fortunately no serious injury was done, but the blow might have been received in a more sensitive part, such as the eyes, and with graver results.

Now, if this tube had not been tied on much less pressure would have swollen the tube larger than the brass connection, and it would have slipped off easily and perhaps have given me earlier indication that the governor was not working efficiently. Having been warned that the instrument was working badly (in fact that being the reason of my attendance) I had gone early to the place of exhibition in order to correct if possible any existing fault. By substituting a new piece of flexible tube for that just burst, I found the new tube would sustain considerable pressure above that required in practice, and then, when pressure became excessive swell, and slip off.

Having tried this as an experiment, and fitted new flexible tubes of good quality and right bore—turned my attention to regulator, and found that the valve of same, even when forced on to its seat, still allowed sufficient gas to pass to fully serve the three jets of the triple lantern, and on taking the same to pieces for examination, the valve and seat were both in good condition, but jammed on the seating was a thin chip of wood or piece of straw not thicker, apparently, than note paper, which had in some way got into stem of regulator, and had then been forced up under the valve keeping the same off its seat, practically putting the governor out of action.

I mention this in regard to the regulator, as it teaches us that we cannot be too careful in wiping out cylinder valve before attaching regulator, or in adopting any means to prevent foreign matter getting introduced into its stem, and also it is interesting to observe how little the valve of the regulator rises, as from the point where gas was entirely closed to the point where it would fully serve three jets was only equal to thickness of a piece of note paper.

There are several reasons why flexible tubes should not be securely fixed, such as facility of changing jets, or inserting new tube, even perhaps when instrument is working, &c.; but the chief reason is that directly excessive pressure is present in the tube it slips off without bursting.

Leaving the above explanations, I must now enter into what seems to be more debatable ground. I find in reading my own article, that there are several things I could have presented in a much clearer manner had time allowed. But at this season of the year, being a lanternist, time is extremely limited, and I must plead this

as my excuse for not being clear as perhaps I might have been.

In the October article I have said, "It is not only a common fallacy, but a dangerous one, to try and find a leak in an oxygen cylinder with a lighted match or taper—it is quite possible to set an oxygen cylinder on fire by so doing."

Our Editor, I believe, has received criticism describing this statement as absurd, that I must mean not an oxygen but a hydrogen cylinder. I fear the criticisms to some extent have been brought about by using the somewhat strong word "dangerous." The word in connection with cylinders seems to always associate itself with the idea of an explosion—and I might, perhaps, have used a weaker term with more correctness, as, if it becomes granted that it is possible to fire an oxygen cylinder, it would be, perhaps, necessary that the cylinder should be a fairly large one, in order to bring about serious results. Although, on the other hand, a very small cylinder might bring about the added dangers of panic or fire, which would then justify the use of the word "dangerous."

To those critics who deem me absurd, I would say that the thing having occurred in actual practice, I may perhaps be not so very absurd after all. The possibility of igniting an oxygen cylinder was brought to my notice whilst conducting experiments relative to the explosion of gauges.

A gauge was subjected to certain conditions, and whilst attached to a cylinder I was able to bring about an explosion within the tube of the gauge. That result did not astonish me. The tube of the gauge, though an old one, stood the maximum pressure of the explosion without rupture, but to my surprise I found that the steel spindle of the cylinder valve had been ignited and fused, and also part of the body of valve burnt away.

This unlooked for result naturally set me thinking as to its cause, and my mind went back to the old school-boy experiments of burning carbon, either as diamond, plumbago or charcoal—when heated and immersed in oxygen, and it was quite easy to assume that the carbon contained in the steel spindle could be heated by the explosion and burnt in the same way, and that being the case, it would follow if any part of the steel cylinder could be by any means made sufficiently hot, combustion might ensue.

So went my theory, but ever since the day in which I was beguiled into swallowing a nasty pill as a spoonful of jam, I have had a strong distrust of theory till actual experiment has endorsed it, and I immediately conducted an

experiment which, with very little trouble, every possessor of an oxygen cylinder can make for himself.

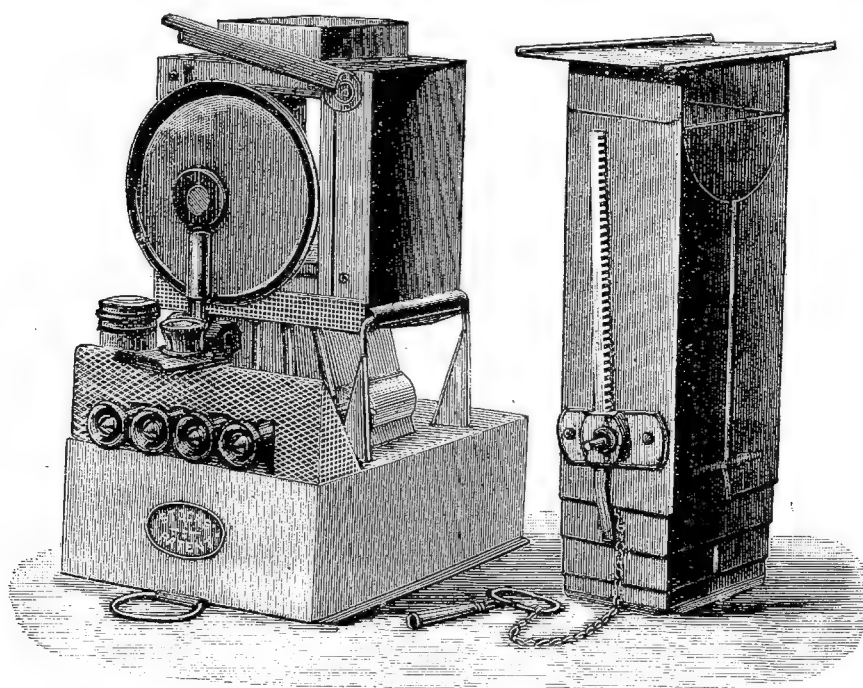
I went to my lathe and turned off several shavings of steel, the usual curls from a sharp cutting tool. These varied slightly in thickness. I then screwed into a cylinder the ordinary nozzle for connecting flexible tube, and opened the cylinder to allow a little oxygen to ooze out of the nozzle, and represent as nearly as possible a slight leak. Into the nozzle I placed one of the shavings, and applied a lighted taper, with the result that the steel burnt furiously. I repeated the experiment, this time using a match; in an instant the steel was on fire—and, although I knew the conditions of my extemporised leak, were not those occurring at every actual leak in a cylinder—I made up my mind that in future I would not at any rate test with a lighted taper, to find if the conditions for successful combustion did or did not exist.

The next experiments were somewhat reassuring. I turned up a steel nipple and screwed it into the gun metal nozzle, the nozzle was similar in form to that of a mixed gas jet, with a hole bored through it of .04 of an inch. I found I could heat this nipple to quite a bright red without igniting same. The next experiment consisted of driving a piece of wire into the orifice, not exactly pressure tight, but allowing gas to leak out round it. This piece of wire would not ignite by means of a match or taper, but did when heated with a Bunsen burner.

The next experiment consisted of introducing a piece of the same steel wire into the nipple, but this time with one projecting end hammered out to a thin flake, and the application of a taper immediately fired it, but in both these latter experiments, although repeated many times, the steel did not burn back farther than the orifice of the extemporised steel nipple.

It must, however, be borne in mind, that a hole .04 of an inch in a cylinder, could be easily located by the senses either of hearing or feeling, and in such a case a small cylinder would leak itself empty in a little time, and a leak of such dimensions is not likely to occur in actual practice. Leaky cylinders that have come under my observation have generally suffered from "weeps," either round the screw where valve has been screwed or soldered in, or through some porosity or flaw in the body or welded end of cylinder, and I can quite imagine some leaks with scaly formations round the locality of the leak to be so constituted, that the application of a taper would be sufficient to fire the thin scales, and set up complete combustion of that part of the cylinder. Fortunately our

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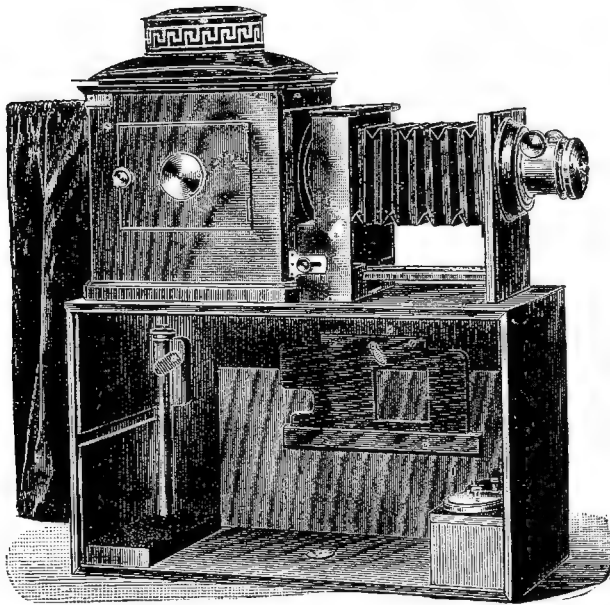
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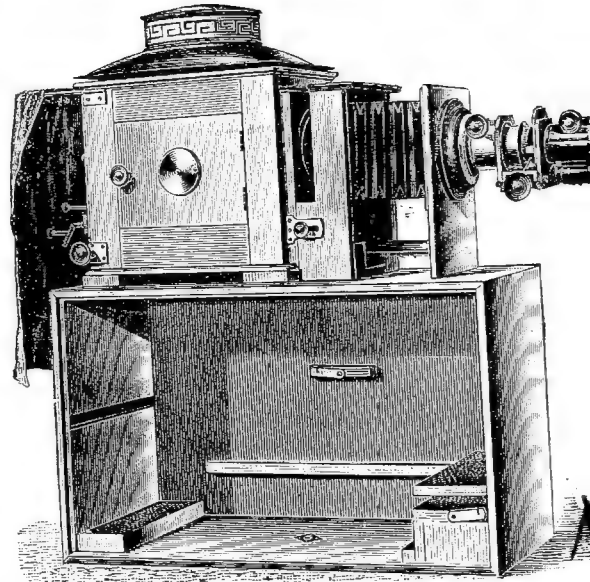
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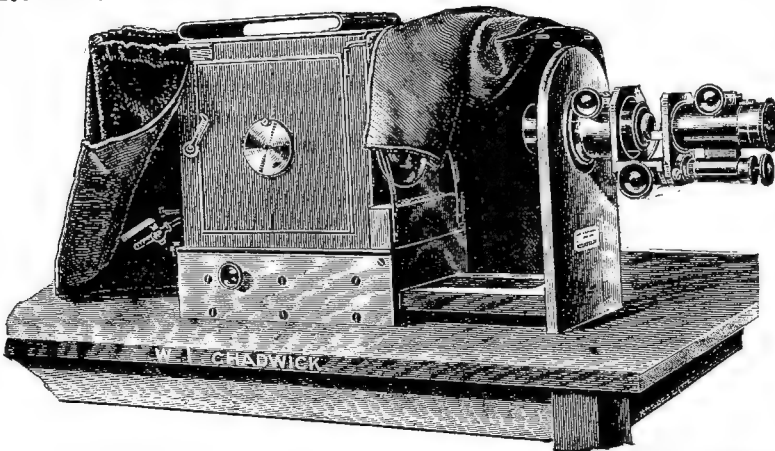
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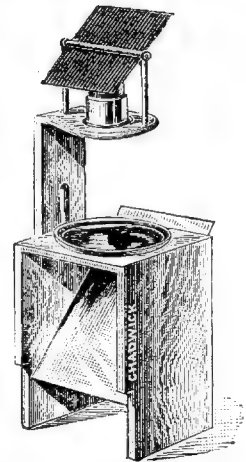


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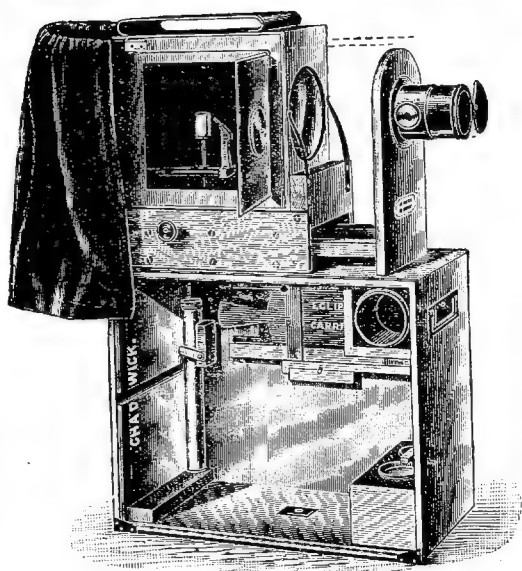


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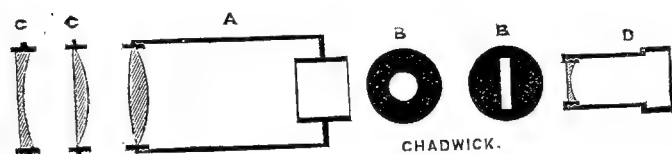
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experiments prove that the conditions for igniting a cylinder are a slow leak from a scaly fissure, and some heating agent sufficient to raise the temperature of the adjoining steel to a red heat.

These conditions possibly being rare, few accidents have occurred. Four cases only have come to my knowledge, no serious damage, except that to the cylinder, resulting. In two cases I had the opportunity of examining the cylinders, and in each case the neck and valve had been burnt right out, and the assumption was that the valve spindle had been the means of imparting the combustion, and as the valve spindle is usually made of steel, containing a higher percentage of carbon than the steel body of the cylinder, this would conform with our theory. The word "dangerous" is perhaps a strong term to use, but I feel sure that any one who will take the trouble to conduct experiment No. 1, will agree with me that an element of danger does exist, and that if not dangerous, it is at any rate hardly a wise thing to search round an oxygen cylinder with a lighted taper in order to locate a leak.

The question, I think, might be put by our editor to some of the oxygen compression companies.

To the critics who consider I must have meant hydrogen cylinders and not oxygen cylinders—I would simply say that I consider the proceeding quite safe with an hydrogen cylinder.

The same rules apply as in the case of gas bags—many of which containing oxygen have been ruined by testing for leaks with a light, or in some places only charred paper or charcoal, whilst in the whole of my experience I have never heard of a bag containing hydrogen alone suffering in the same way. Oxygen, the greater supporter of combustion, not being present, the element of danger goes down 100 per cent.

A capital way of locating cylinder leaks is to immerse a charged cylinder under water, and leaks not visible even when under hydraulic pressure are then easily seen. Care also should be exercised in screwing down cylinder valves—much injury is brought about by using too much force—so long as gas does not exude the less force applied the longer the life of the valve, a little water poured in above the valve will instantly indicate any leak.

I have suggested an element of danger which apparently may seem new, and therefore a word in closing on the safety of cylinders will perhaps be acceptable.

It does not seem generally known that every time a cylinder is charged it is subjected by the compressor to a pressure of from 60 to 90 lbs. on the square inch, over and above the pressure

when received by the user, the heat disengaged during compression does not radiate fast enough to keep the cylinder at its normal temperature, consequently the cylinder has to be pumped up from four to six atmospheres (depending on the speed gas is pumped in) above that required, the four to six extra atmosphere being lost in the cooling—thus every time a cylinder is charged the compressor tests the cylinder by subjecting it to a pressure above that at which we use it.

—:O:—

The Lantern of the Future.

By W. H. HARRISON.

SOME ten or twelve years ago, when portable cameras were, as a rule, far inferior to those of to-day, a few articles of mine on "The Camera of the Future," gave rise to long and varied correspondence, showing widespread interest in the subject, and a general desire for improvement in the apparatus used by tourists. Not long after came the fundamental improvement made by Mr. McKellen, upon the older types of portable cameras; then other manufacturers added their share of improvements in construction, to the benefit of the public and to the advantage of themselves.

Magic lanterns similarly are now in a transition state, and it is pleasing to see that the public criticisms of the past year or two, by various competent persons, are beginning to bear fruit, for at the commencement of this winter season advertisements are appearing announcing the advent of triple condensers for the lantern, and improved projection lenses specially made for the purpose upon high optical principles. Although experimental doublet condensers have been made which will include as wide an angle as a triplet, the lens next the light has to be so very thick, and so close to the illuminant, that its fracture by the heat is likely to be of more frequent occurrence than is pleasant, especially in the hands of inexperienced persons. Therefore it may be taken for granted that in no very long time the triple condenser will supplant the double condenser among the many persons who will not mind paying a trifle extra to obtain one, whilst the double condenser will perhaps hold its ground because of the many who are beginning to keep lanterns in the house merely as an optical toy to amuse the younger members of the family, and who desire cheapness.

The manufacture of these instruments being now in a transition state, the time is a good one for users of lanterns to come forward in these pages, and to tell manufacturers what they want. What, then, is likely to be the common *efficient* magic lantern of the future?

That it will be one with a triple condenser may be taken for granted; the next point—and one which the public will insist upon sooner or later—is, that it shall be made of an exceedingly colourless glass, and I have not yet noticed that any manufacturer claims in his advertisements to have given attention to this point. Fine optical glass is not necessary in a condenser, but the glass should be good enough to be colourless. Oxide of iron gives the green tint to bottle glass, and soda gives a greenish tint to glass, consequently in making glass for condensers, the purest white sand free from iron should be used, and potash instead of soda. Some glass makers use oxide of manganese to abolish the greenish tint of their glass, by oxidising to a still higher degree the oxide of iron, which then does not impart colour when present in small proportions; this plan is bad for lantern condensers, because glass containing traces of manganese is likely in time to take on a purplish tinge, especially under the action of light. Some beautifully colourless five-inch triple condensers are now in the market on the Continent, and perhaps here also, but they are made for a higher class of instruments. Any colour in the glass can be easily detected by placing the condenser on a sheet of pure white paper, and looking at the paper through the glass in bright sunshine or daylight.

Now we come to a point over which there may be difference of opinion, as to the optical system of the standard common magic lantern of the future. Within certain moderately wide limits the condenser and the projection lens should be made to suit each other, and this raises the question whether the coming lanterns should have long focus or short focus projection lenses? Leaving others to advocate a short-focus system, I express decided preference for a long-focus system.

In a private house, with rooms of average dimensions, I prefer a smaller disc brilliantly illuminated, rather than a larger disc more feebly illuminated; in addition to this home advantage, the same lantern is likely to be of use in halls of moderate size. But yesterday a case came under my notice, in which a society had to borrow a lantern with a long-focus lens system, because its own lantern with a short-focus optical system, could not conveniently be modified to suit a large hall. As with cameras, so with lanterns, a long-focus system taxes the lenses and intellects of the opticians less than does a short-focus system, not that there is anything very taxing anywhere in the construction of ordinary magic lanterns.

Next we come to the projection lens. To begin with, it is absolutely necessary that it

shall be large enough in diameter, and short enough in length of mount, to take in the whole of the end of the cone of light coming from the condenser, otherwise plenty of light will be wasted. To please general observers, there is nothing like throwing a great volume of light upon the screen; they are not so very critical about sharp definition.

As to the focal length of the projection lens, Mr. Andrew Pringle once stated that he practically found that the most generally useful projection lens he possessed, was of eight inches focal length, which is not particularly short. I prefer one of nine inches focal length, and never to use one shorter if it can be avoided, although several of longer focal lengths should be at hand, for use with the same condenser.



A leading reason for advocating that the shortest focal length for a standard lantern for general use shall be nine inches, is founded on some facts set forth in Mr. Lewis Wright's book on "Optical Projection," in which he says of a projection single lens, as shown in the cut, composed of two double convex crown lenses, with a concave of flint between them: "For lenses 9 inches focus and upwards, no stop whatever

would be required, and such lenses would be much cheaper, and pass more light than double combinations." Such lenses were once much used by Mr. Dancer for his lanterns, and some have even been made of six inches focus, in which the then necessary stop, in the right position, cut off scarcely any rays of serious importance, and had excellent optical properties. Mr. Wright says:—"Assuming the back conjugate focus of the condenser to be 4 inches (*i.e.*, about 3 inches from the back of the condenser), and the radiant to be $\frac{3}{4}$ inch diameter, nearly all the effective rays can be condensed into an objective of 2 inches diameter, up to 9 inches from the face of the front lens of the condenser. This gives a focus for a double combination of, say, 10 inches, within which there is no need of greater diameter, and no benefit from it. Beyond that, a 2 inch lens will begin to lose light, but $2\frac{1}{2}$ inches diameter will carry the same result up to 13 inches; and, it is only when we reach distances of 15 inches and upwards, that 3 inch lenses are of any real advantage. For such long foci, however, the 'double combination' is quite unnecessary, as with care in selection, single achromatics can be obtained which will give quite as good images." He adds that at long ranges the

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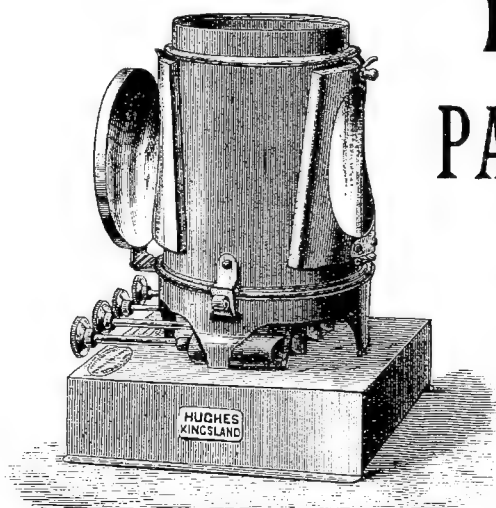
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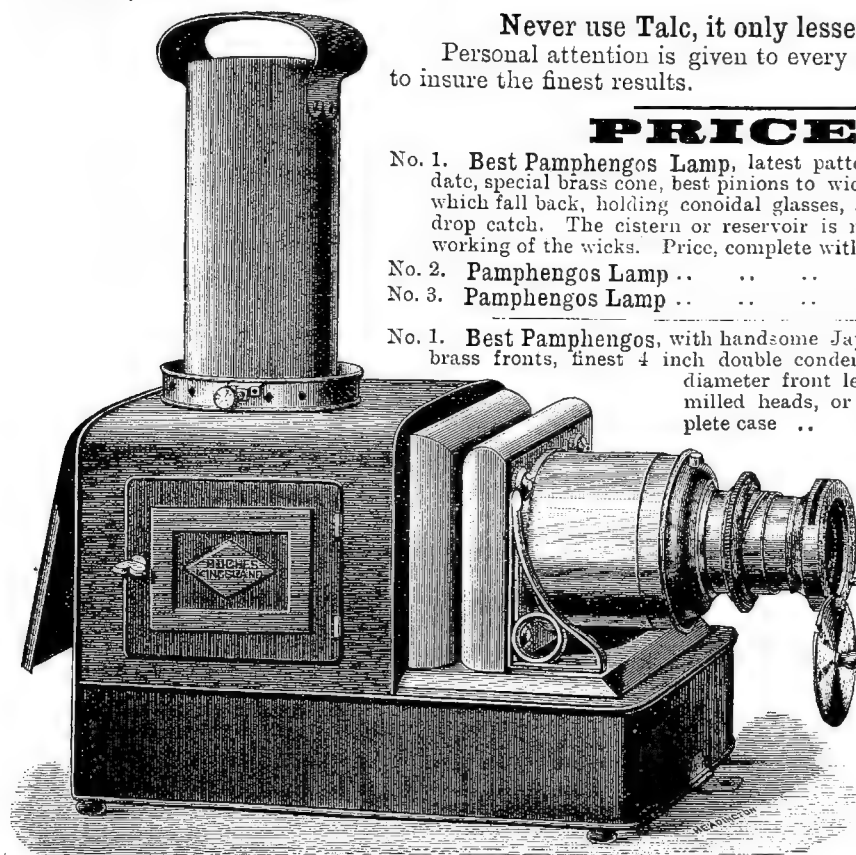
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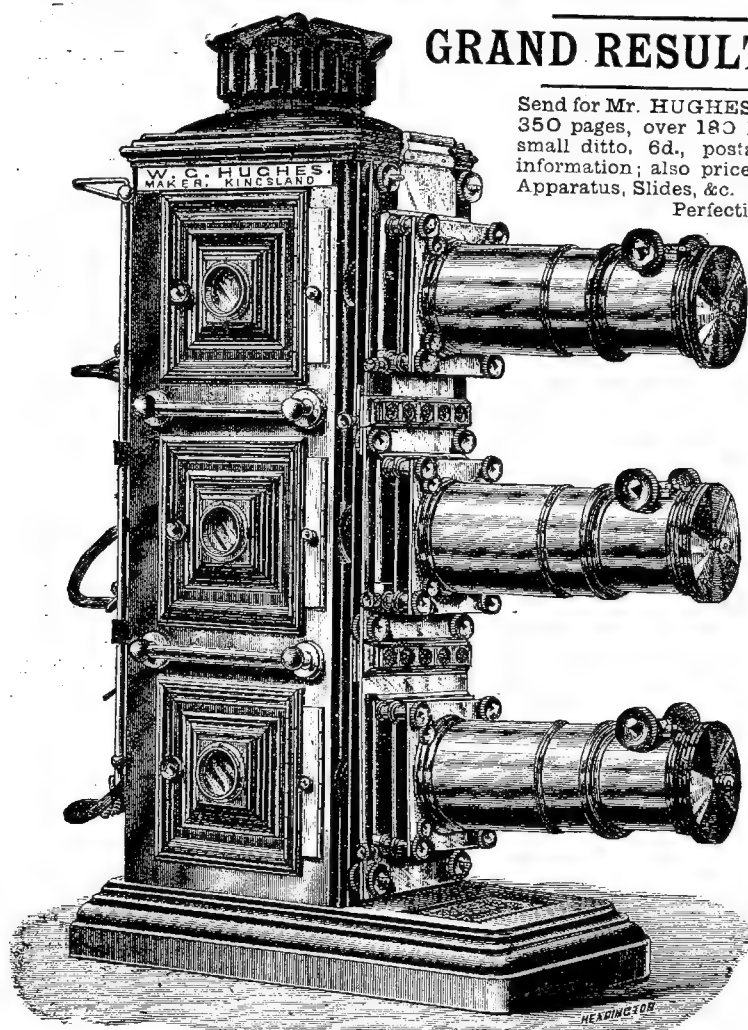
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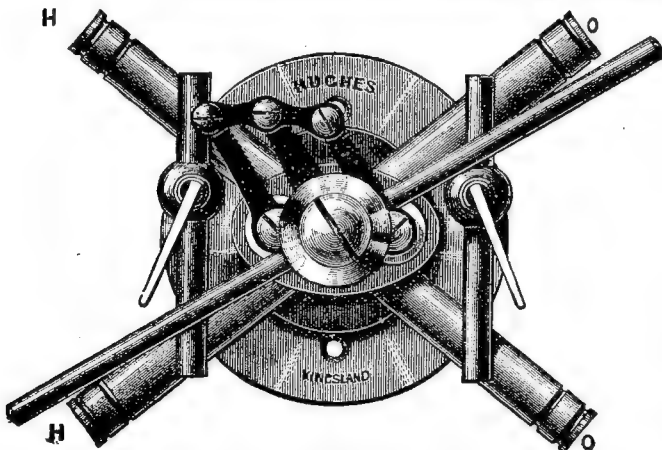
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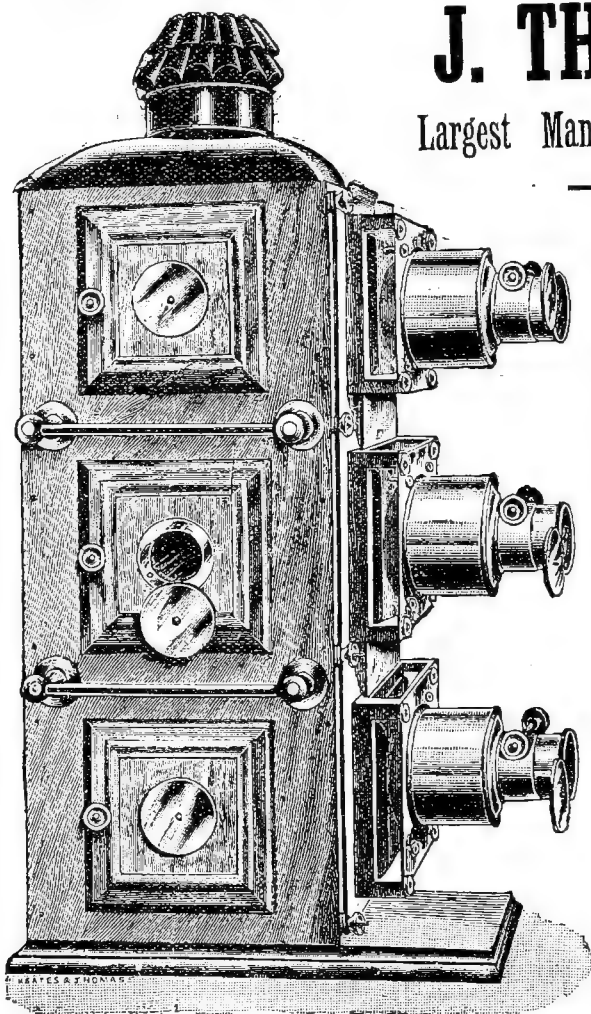
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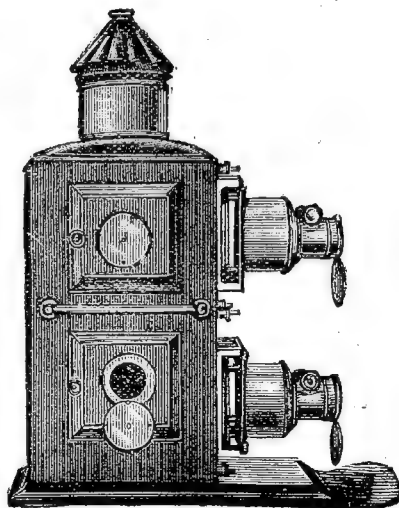
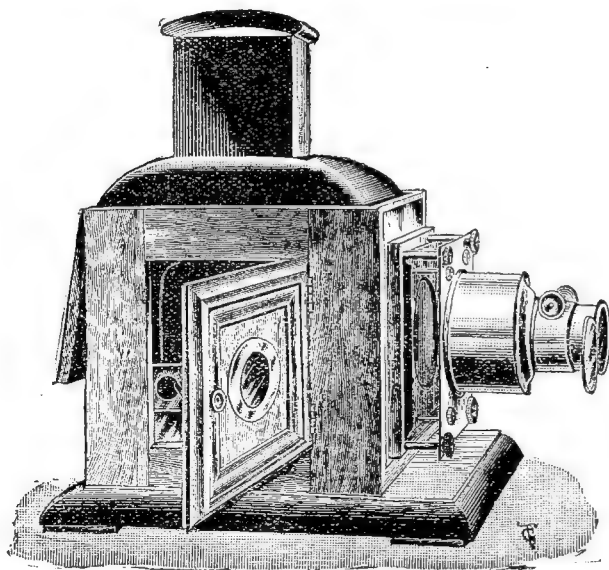
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single combination lens pictured in the cut, will pass more light than the double form. As many persons will use oil with their lanterns, consequently have a larger radiant, while a purchaser is about it, it seems to me that he might as well have his single achromatics not less than three inches in diameter, to err on the safe side.

Another point to be decided in a standard common lantern, is the diameter of the condenser, and here great authorities are at variance. One of the best authorities I know, and who was once an advocate of small condensers, tells me that experience has driven him to conclude that those of larger diameter are better, and he now believes in condensers five inches in diameter for ordinary lantern slides. In such case, of course, there must be the power of regulating the distance of any particular slide from the condenser, that the slide may be in a position to pass the maximum amount of light from the cone of rays which it can utilise to the best pictorial advantage. A farther question is, whether the element of the condenser nearest the light shall be a plano-convex or meniscus lens; a shallow meniscus gives little practical advantage in the matter of light; a very deep meniscus gives rather more advantage in the collection of light, but has in addition the great advantage of its centre being further from the heat of the radiant; this gain is of importance.

The lantern should be made in two parts, with the power of removing the whole of the front part in a moment. In the one part should be the radiant and the condenser, in the other part should be the slide and the projection lens, and the distance between these two parts should be adjustable by a rack and pinion or other suitable mechanism. Perhaps in this matter the use of a lever motion deserves consideration. In the coming time there is no doubt that the majority of photographers, at all events, will not be satisfied with a lantern with a tin cone and other adjuncts firmly fixed to its front, and either not removable at all, or removable with difficulty. Each slide must be in that part of the cone of light which best suits it, and a lantern to an intelligent man loses half its value if the front cannot be quickly entirely removed, and the radiant and condenser left for scientific experiments, with such projection lenses on telescopic upright stands as may be suitable therefor.

As to the radiant it is unnecessary to say anything about the lime-light, which will be employed by those who are in the habit of using it, and the jets for which have already been brought to such perfection as to give general satisfaction when proper selection is

made. But a great number of people will use oil or gas light, and with optical apparatus such as has herein been described will get much more light upon the screen than was usual with many of the lanterns of the past.

The lamp or burner for producing the light, and the substance to be burned, now deserve attention. The object to be attained is, to get the largest possible amount of light into the smallest possible space, and fortunately this same problem has had to be solved by the authorities of Trinity House, in relation to small as well as to large lamps for certain light-houses. The lamp of Sir James Douglass was the best they could find, and consists of the "compressed" flame yielded, when paraffin is used, by three concentric wicks; the flame is supplied outside with air by means of several "Douglass cones" which allow the air to impinge upon the flame at different levels, and just where it will do the most useful work. There is also the usual air channel up the centre of the lamp. The lamp chimney bends inwards instead of outwards just above its base, to compress the flame and the air supplied thereto. Trinity House has lamps with more and less than three rings, but the latter is the best for the magic lantern; the two-ring burner is good. Argand burners with concentric rings, with trumpet-shaped glass chimneys, and with the Douglass cones, are also made for burning gas, but coal-gas is not employed; oil gas is used, which gives a great deal more light even than does paraffin oil, so that the common experience of paraffin giving more light than gas, is here reversed. The gas is made on Pintzsh's system, by allowing light petroleum spirit to fall drop by drop into a heated retort; it will bear pressures and changes of temperature which common gas will not withstand without partial decomposition or splitting up, and, so far as I now remember, its illuminating power is much more than double that of ordinary coal-gas. Burners such as those just described, either for gas or paraffin, would necessarily be expensive for the lantern, and the only way of cheapening them would seem to be to turn out their parts by specially constructed machinery. They must be made to true measurements and accurately fitted, for small deviations deteriorate their performances.

As the glass chimney curves inwards at the base instead of outwards, the light for the lantern can conveniently be still farther increased by means of a very small reflector placed not far from the back of the flame; the radial point of the curve of the reflector must be middle of the flame, or the reflector will do more harm than good.

Some of the concentric three-wick burners require a chimney of abnormal length to yield

the best results as regards illumination; the two-ring require nothing abnormal in this way, but the chimney, as in all lamps, should be of the proper length and form to suit the particular burner.

Let it not be supposed that it is now suggested that these expensive Trinity House lamps shall be used in the common magic lantern of the future, indeed, their cost can be considerably reduced; the facts are put forward to show in what direction there is room for inventive genius to exercise itself in the production of a more luminous oil or gas radiant for the magic lantern than is in use at present, and that will give an evenly illuminated disc. The flames of these multiple concentric lamps look streaky; the edges of each flame look brighter than the centre, so that in a three-ring lamp there are six vertical streaks in the flame connected by areas of less luminosity. This streakiness will not show on the screen, considering how far the broad bands of light and darkness of the present three-wick lamps for straight flames are masked when the screen is examined.

A moderately cheap approach to efficiency may perhaps be obtained by means of a three-ring gas burner, with trumpet-shaped chimney to compress the flame, used without the Douglass cones, and supplied with gas charged with the vapour of crude coal-tar benzole. This has an advantage over naphthalene for charging the gas, because, as Mr. F. Varley discovered, the coal-gas itself curiously enough becomes condensed on mixing with benzole vapour, the product forming a rich illuminating material.

(To be continued.)

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Secrets of Success of a Lantern Lecture.—No. 2.

By WILLIAM KIRKLAND.

In my former communication I endeavoured to show the ins and outs of the general management of an entertainment relating, for the most part, to the manager, or managing committee. I will now say a few words respecting the operator and lecturer.

Ere the audience are admitted to their seats the operator should see that everything connected with the lantern is in readiness, and that all requirements are at hand, not forgetting an extra supply of limes, and an extra foot or two of rubber tubing.

Many operators still use gas bags, and when so doing, too much care cannot be exercised to keep "the small boy" away from the apparatus, to which end a temporary fortification should be placed around the apparatus.

As the operator has a great responsibility resting upon him when employing bags, he should make certain that the oxygen bag contains oxygen only, and the hydrogen bag, hydrogen only. This may appear to many to be a superfluous precaution, but it must not be forgotten that when gas bag explosions have occurred they have generally been traced to an admixture of gases in the bag, without the knowledge of the operator. It is only the work of a few minutes to test the contents of the bags before the performance commences. This can be done in a very simple manner. Allow a little gas from a bag to enter a small tin can held mouth downwards, and after the air has had time to be driven out insert a small piece of ignited timber. If the gases be mixed a small and harmless explosion will occur. If oxygen, a flame will be produced at the tinder, whilst, if the smouldering article be placed into hydrogen, it will go out. In an entertainment of the class we have referred to, effect slides are generally expected; these should be carefully registered, so that there will be no necessity for dodging them about when they are on the screen. When giving a lecture it is all important that the voice be distinctly heard all over the room or hall. The lecturer may himself imagine he is shouting, whereas the audience a short distance away may not even hear him. It is well, at the commencement of a lecture, to arrange with some one at the far end of the hall to indicate, by means of some pre-arranged signal, whether the speaker can be distinctly heard at that distance; and when speaking, always speak as if to some one at the far end of the hall.

Three or four subjects, of a quarter of an hour each, are far more preferable to one subject occupying an hour; and as the majority of printed lantern readings are too long and prosy, the best advice that can be given to the lecturer is cut, cut, cut.

Mr. D. W. Noakes, a member of the well-known firm of lantern manufacturers of Greenwich, referred in a recent issue of this journal to one of the "Nibs for operators." I procured their catalogue containing them, and was so well pleased with the hints contained therein that I quote a few:—

Bad limes break good condensers.

A gassy operator often runs short of it.

A dirty screen shows dirty pictures.

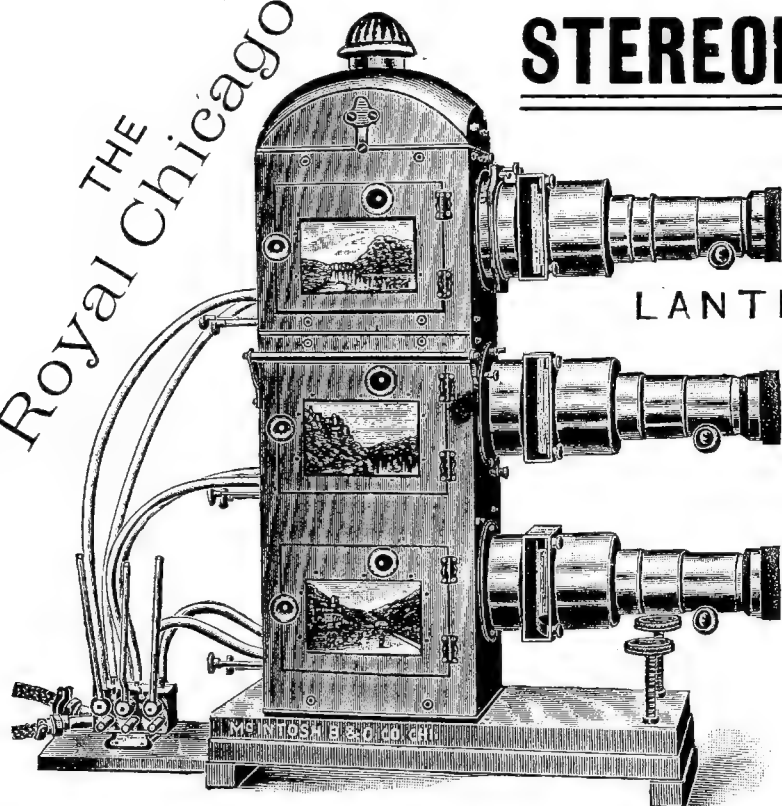
Keep yourself and your lantern cool.

A good triple only needs one operator.

It is impossible to guard your limes too zealously from the air.

The operator may be seen, but should not be heard.

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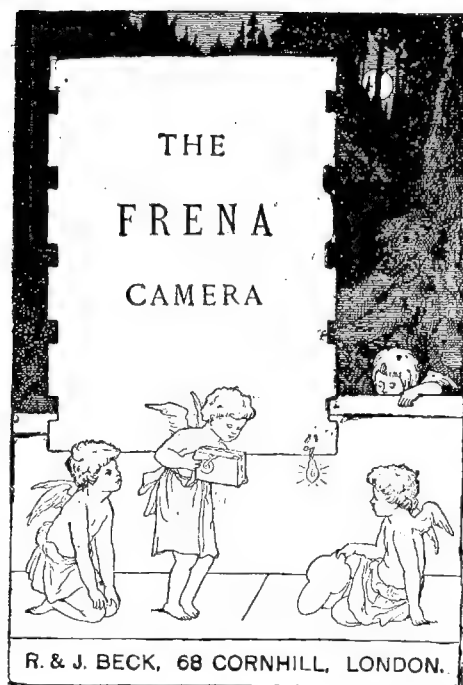
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TO LANTERNISTS.

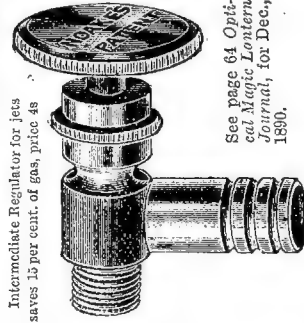
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It is so constructed that it screws into the back of the Jet Cocks in lieu of the usual bends, or can be attached direct to the Jet Tubes.

See page 64 Optical Magic Lantern Journal, for Dec., 1890.

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Too much oxygen or hydrogen at the jet is as bad as too little.

When working with cylinders do not leave the keys at home.

Method and order are companions to success.

A bad method well worked is better than none.

The name of a lantern adds not any to its power.

Don't oil your jet movements.

Give the operator, who tries to find a leak at his bags with a lighted taper, a wide berth.

The oxygen bag would be most likely to catch fire.

If you have a cold, don't wipe your lenses with your pocket handkerchief, the proper thing is a chamois leather.

Do not clean your lacquered brass with brick dust.

Screw eyes, nails, &c., injure good lenses. Keep different compartments for each.

After filling a bag, always turn the gas off at both ends of the filling tube.

Cold draughts from open windows will crack heated condensers.

A good light will break a dense slide, if too long in the lantern.

Patience is a necessity to the operator showing for a long-winded lecturer.

In foggy weather work nearer the screen.

In cold and wet weather warm your slides, especially after a tea meeting.

The operator will not be insulted if he is asked to have tea.

A bad operator can spoil a good show.

You cannot dissolve on the next picture with the shutter down.

Neither can a picture be projected through the curtain plate.

A good operator can see the faults of his picture before it is fully on the screen.

Effects should not be attempted without a good system of registration. Although dodging effects about the screen often create more fun than the lecture.

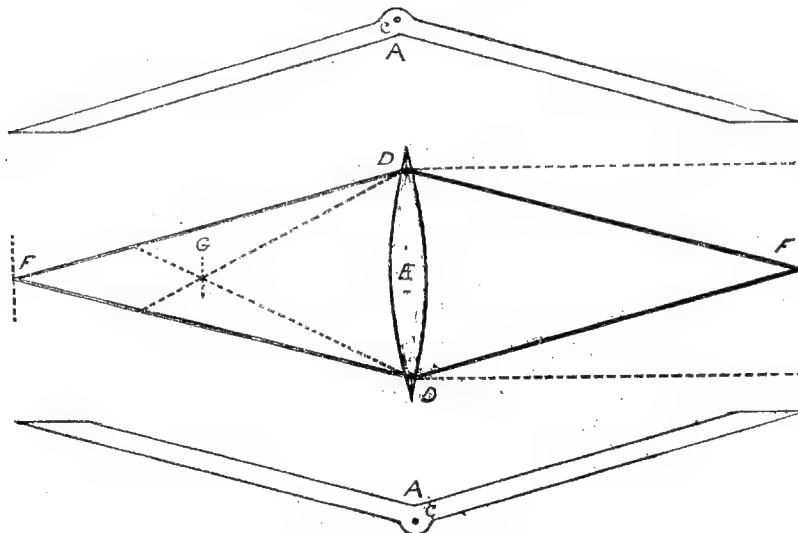
Conjugate Foci.

BY JAMES B. SPURGE.

FROM what I have at various times read in the pages of *The Optical Magic Lantern Journal*, it appears that the subject of conjugate focus is one in which a large number of readers are interested. I have made a diagram which may be of general interest, and especially to a correspondent who enquired "why it was, that, if, when the optical lantern is projecting a picture, it be moved further from the screen, a readjustment of the lens system became necessary?"

The annexed diagram approximately illustrates what takes place, although, strictly speaking, it applies to the principle axis, and to a lens the thickness of which can be ignored.

Cut out, or make a copy of the two angle pieces A and B, and at the dots CC, pass an ordinary pin through each, which will act the part of fulcrums or pivots. The pins and angle pieces are then pushed through DD, on the lens E. It will be found upon trial that the extreme ends of the angle pieces will meet at the symmetri-



cal points, FF, which are situated at the minimum distance of conjugate foci, or in other words at the least distance at which the lens will form the image of an object placed at either one of them.

Having secured the angle pieces on E, as stated, proceed to move the angle pieces on the pins until the legs upon one side intersect at the point G, which is at one quarter of the distance between the two points, FF. It will then be found that the other legs of the angle pieces will have become parallel, and if continued in length, only meet at a very great distance. But by arranging that the intersection shall occur at points upon either side of G, it will be seen whether the rays upon the opposite side will be either convergent or divergent, and that by extending the lines in the case of converging rays, the conjugate foci will be found at the point of intersection.

—:O:—

A Lanternist's Diary.

BY AD-AMICOS.

WHAT is more difficult to keep than books or umbrellas? Why, a diary. Ninety per cent. of the would-be diary keepers give it up as a bad job before half a dozen pages have been covered. Something unexplainable infests the atmosphere that encompasses the book of misfortune on all sides. The last days of the month of December are the days when most diaries are sold, are also the days when more resolutions are framed, ready for the dawn of a New Year. Of all resolutions that lack stamina, perhaps those of the diary type are weakest.

It would be impossible for the writer to say how many times he has commenced to keep a record of passing events and has as often failed. But when lantern work presented itself in a serious light, in other words, when taken in hand for study and profit, everything connected with it must be carefully noted and digested, and so it was that I commenced accumulating facts, or anything appertaining to lantern work, until the book has arrived at something like "Encyclopaetic proportions."

My diary is not an ordinary commonplace one, in the general acceptation of the term, but a chronicle of interesting studies, a detailer of the advancement of the various scientific achievements in their relation to the perfect picture on the wall, a curriculum, so to speak, of the "Whole bag of tricks." It has therefore been considered worthy of overhauling for the purpose of extracting therefrom, from time to time, some reminiscence of what has occurred

to its compiler, and which may be acceptable to the numerous readers of this journal.

But perhaps before giving any extracts it will not altogether be out of place to state, in as few words as possible, how it was I was shamed. Yes, kind reader, actually shamed into keeping a diary.

Twenty years ago our party was staying at McInnis's Hotel, Hutchison Street, Glasgow. There was Thompson, the pianist; Madame Florence, the ballad vocalist (who, by the bye, was Thompson's wife); Bob, the baggage man—Bob was also our operator, and about the best manipulator of lime-light apparatus I have ever known, both before or since—and myself. I have called Bob a baggage man, though we each did our share in that department; but it was how he styled himself when applying for the birth.

He had travelled the kingdom thro' and thro' with exhibitions of all descriptions, from a penny waxwork show to the Royal Italian Opera Company, and was not only a well informed but really a handy and valuable man.

He never took a liberty, knew his place to a nicety, was good tempered, and was generally in good favour; moreover, had it not been for Bob, this article would not have been thought of.

"Bob, did you find that book?" "Book sir, what book?" said Bob. "That note-book of mine Sweden," I replied. "Oh, no, sir, I have'n't seen that since you were reading it to the reporter chap." "Botheration," I muttered, "Another of my pet schemes lost, or murdered."

Half-an-hour later I had again occasion to call Bob over the coals—my umbrella couldn't be found. And where, oh, where could it be. But Bob settled the thing for me, with, "Dash my buttons, sir, that's lost, depend upon it, for you hav'n't seen it, neither have I, since Tuesday, when you left Williams in Trongate. He was carrying it when you met me, and you were lighting a cigar." Very well, Bob, I'm blowed if I'll buy another, "books and umbrellas, umbrellas and books, nothing on earth is more difficult to keep." "Nothing, sir," said Bob, thoughtfully. "Nothing, Bob," I returned, "and to the man who can convince me to the contrary, I'll stand, yes, hang it, I'll stand him a new hat." "Now, sir, you've known me long enough to know I'm not in the habit of taking a liberty, and I *don't* want a new hat; but have'n't you found it harder to keep a diary, sir, I know you've made a good many attempts?" Bob had me there, I had to confess, and I straightway gave him a half-a-crown to buy me a bran new diary, for the year was just beginning. "I'll do it, Bob," I shouted, "I'll do it." And I did. And that's how the conundrum that

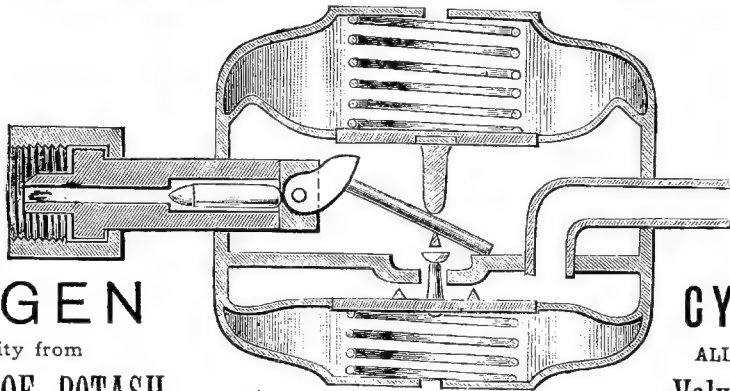
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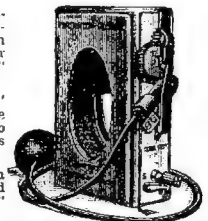
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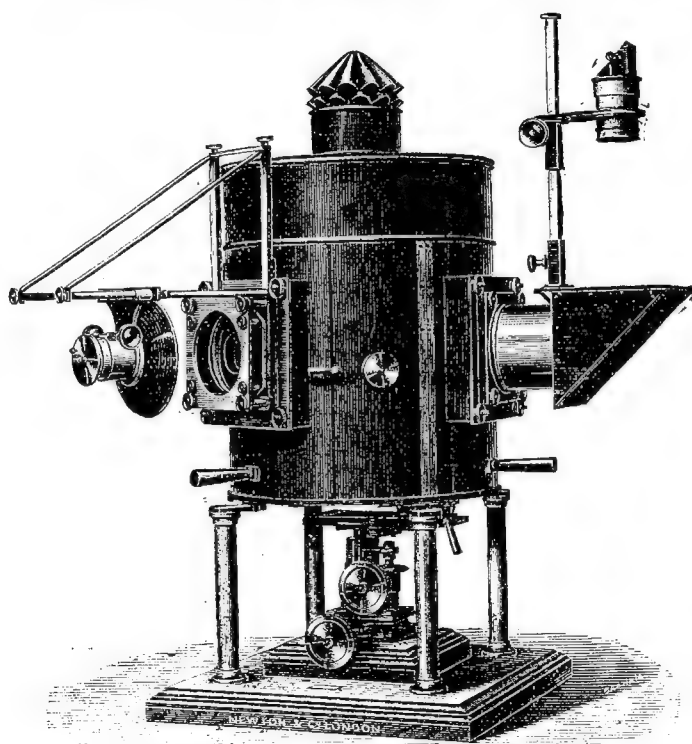
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Newton's Patent Tubular Slide for Bi-Unial Trays

heads this paper was framed. How my diary was started with success, and how Bob won a new hat.

The incident connected with my first entry wants now no explanation, the entry run thus:—

January 7th, 1872. Bob to-day cost me 13/6, being the price of his hat and this book. I hereby declare to note herein day by day, or whenever it should occur, all items of interests connected with my lecturing tours, apparatus and scenes in my wanderings.

January 9th, 1872. Lectured at Kirkintilloch last night, with much success—although, in consequence of an accident to a gas bag, we were for a time in doubt as to whether we could fulfil our engagement.

It so happened on this particular day we were in high spirits—jubilant and careless. And on our arrival at the little station, our luggage was not treated with that respect that we could have wished, for when lifting the hydrogen bag into the chaise—there awaiting us, we were appalled to find it nearly empty, and the gas escaping from a hole in the side. What was to be done? we could not get to Glasgow and back with a new bag in time. Bob, however, was to the fore, and was certain a kip-skin plaster would make the damage good; and while he was repairing the injury with his kip-skin and sadler's cement, we ascertained the best and quickest means of getting it charged with house gas. This was completed in good time, but not without some anxiety as to whether the patch would give way before the exhibition was over. More care than usual was exercised that night, but our efforts were crowned with success.

April 23rd, 1873. Have been reading the leaders in the dailies, which are principally Shakesperian. After dinner, met my coadjutor, R., who has promised to help me on Wednesday night.

My friend R's name I am pleased to see occasionally in the pages of the *Optical Magic Lantern Journal*, and as that gentleman has permitted the writer from time to time to use subject matter of his, I have pleasure here to be able, with his sanction, to give the words of his "Pipe Song," which may be spoken by any lanternist when showing the effect scenes of the seasons. Pictures may be introduced between the spring, summer, autumn and winter, as the verses suggest.

GARDENER'S SONG OF THE SEASONS, "MY PIPE."

SPRING.

I love to sit in the evening,
When the children play,
And I hear the lambskins bleating,
At the close of day;

In the spring I'm always planning
Beds of summer flowers,
Over which the breeze is fanning
Growing, April showers.
Then out I take my bacca box.
To fill my vessel of clay;
I strike a light, and then I have
Only to puff away.

SUMMER.

When the buttercups and daisies
Shine through the waving grass,
And the birds are singing praises
As the reapers pass.
When the trees with plums and cherries
Are laden full and ripe,
And the hedges filled with berries,
Then I like my pipe.

AUTUMN.

When the brown trees plainly whisper
"Winter's coming soon,"
When on the autumn meadows
Shines the harvest moon.
When anglers come, with rod and bait,
To wary fish decoy,
I watch them o'er the garden gate,
And then my pipe enjoy.

WINTER.

I love to sit with the children
Around the Christmas fire,
And tell them fairy legends
Of which we never tire.
When the snow has fall'n and drifted,
When hips and haws are ripe,
I draw my chair close to the hearth,
And so enjoy my pipe.
Yes, I take out my bacca box
To fill my vessel of clay;
I strike a light, and then I have
Only to puff away.

Further extracts I must defer to a future date.

—:o:—

Management of Saturators.—2.

By A. W. SCOTT.

In the previous article on this subject, several tests were described, which may be termed the manufacturer's tests. They are those which are applied by the writer to saturators and jets sent out by him, and which he finds sufficient to ensure satisfaction on the part of his clients. A purchaser buying such tested apparatus has no occasion to apply tests himself; he can at once proceed to use the apparatus without fear or uneasiness. However, saturators, like other good things, are occasionally picked up second-hand; and when this is the case, and there is no instruction bill at hand, probably the first mixed jet that comes handy is connected with the saturator, and the result is more or less a failure. In such a case a perusal of the manufacturer's tests will show where the fault lies.

The reason why a jet which answers with coal gas does not always suit a saturator, is that coal gas mixes much more quickly with oxygen

than ether vapour does. If we connect a blow-through jet, by way of experiment, with a well-warmed saturator charged with ether or gasoline, so that the vapour issues from the large aperture, where it burns like coal gas; and then send oxygen through the centre of this flame in the usual manner, we obtain only a poor light, and there is a large black spot on the lime, surrounded by a ring of incandescence. The black spot shows that the oxygen strikes the lime nearly pure at that part owing to the vapour not mixing with it. Try the same jet with coal gas, and the black spot vanishes, the gases being sufficiently mixed before reaching the lime.

A mixed jet, for saturator work, requires therefore a perfect mixing arrangement, so that the vapour may be thoroughly mixed with the oxygen before being burnt. A jet which suits a saturator is sure to be a good one for coal gas work.

Short-circuiting inside a saturator is a very rare fault, and only occurs after use with an unsuitable jet. Referring to my books, I find that during a certain number of months about 150 saturators were sold, and during the same period only three of these required re-stuffing, owing to disturbance of the packing. As the cost of re-stuffing is trifling, a saturator ought to last as long as a lantern. A re-stuffed saturator is practically as good as a new one in performance, if not in appearance.

If 150 gas bags had been sent out during the same period, the record at the end would be something like this:—Gas bags in good order, little used, 70; leaking slightly, 50; worn out through hard wear, 20; burst through overfilling, 5; burnt or exploded 5. This estimate is based on a long experience—ten years with gas bags, followed by three with saturators. Comparing gas bags and saturators, the evidence is entirely in favour of saturators, both for durability, reliability, and economy.

The colour of the ether light is about the same as that of coal gas; but benzoline and gasoline give a *whiter* light than coal gas; and as with the same candle-power, the area of incandescence is smaller, it may be affirmed that they give a sharper and better defined picture than coal gas or ether.

"Pops" seem to be becoming memories of the past, so far as jets with punice packing are concerned. During last season only two were reported to me; and although continually testing new saturators and jets the writer has had only one pop in the last two years; this was caused by his omission to warm the saturator.

Although practically no attempt has hitherto been made to extend the use of saturators to dissolving lanterns, yet several lanternists have

successfully shown dissolving views with the aid of gasoline and the ordinary star dissolving tap.

Recently, the writer has made some experiments on different ways of dissolving, and has come to the conclusion that a six-way tap is not the best arrangement. The proper place to cut off the gas supply is at or near the jet taps, and the rubber tubing between the jets and saturator should be nearly upright, to permit of any condensed liquid which might settle inside the pipes in cold weather, to drain back into the saturator by its own weight. There are several jets in the market with cut-off taps.

A convenient way of making a dissolving jet, is to attach a four-way tap to the nozzles of the jet permanently by screwing or soldering. The jet must obviously have a firm clamping arrangement, in order to bear the pressure of the hand on the dissolver without shifting from the axis of the condensers. Some of the better-class lanterns, with brass trays, grip the jet at two points, and hold it quite securely. Jets which depend only on the upright rod of the tray, will need to be tightly clamped, while the dissolving plug should be well greased, so as to move at a touch. However, these details are self-evident, and the best arrangement for holding the jet will be found out in time, on the principle of the survival of the fittest.

—:O:—

The Original Dissolve.

By W. R. HILL.

In this journal of last month's issue there appeared an essay by Mr. W. I. Chadwick, under the heading of "Small Lantern and Dissolving Views." Now in this essay Mr. Chadwick says that dissolving was originally produced by a "comb" or serrated "fan," worked in front of the objectives by a mechanical arrangement for gradually cutting off the rays from one lantern, with the gradual opening of the other lantern.

As my partner (Mr. Childe) and I were the sole inventors of the "dissolve," I feel bound to correct Mr. Chadwick as to the origin—The "fan" he speaks of was brought out by Carpenter and Westley several years after our production, as I will now prove.

It was in the early forties that an idea suggested itself to Mr. Childe of being able to produce a mysterious effect by gradually bringing on the second picture, so as to mingle with the other picture already projected on the screen with the other lantern, there to fade the first picture gradually off, leaving the second pic-

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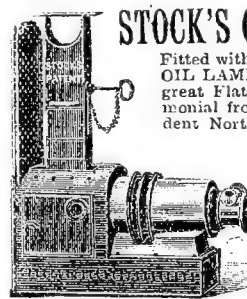


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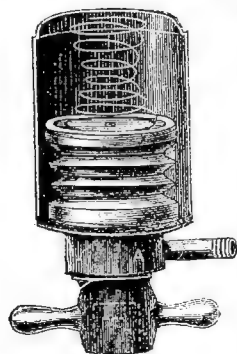
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ture clear, continually changing the pictures, first one lantern, and then the other. The very first method was the covering up and uncovering of the nozzles by means of placing our hands over the fronts of them; and, although primitive, gave us a very good idea that a field was open for great improvement. Among many plans, Mr. Childe made up two balls of wool covered with baize, a little larger than the openings of the fronts of the lanterns, so that when they were pushed slightly in, the spring of the wool would cause them to act as soft wedges. The dissolve was effected by slowly removing one from one lantern, and covering up with the other. This mode we considered a great improvement on all former ways, and kept it a profound secret, only using it on special occasions of grand gatherings at the houses of gentlemen, we being our own exhibitors.

Still on the voyage of discovery an idea struck me, if I could make an arrangement so that the light would first make its appearance right from the very centre of the lens, it would prove much more effectual than that which we had hitherto tried, and I was not far out in what I surmised. To produce this I cut four pieces of millboard into squares, out of the centres of which I cut an oval about the size of an egg, horizontally, two of these were used for each lantern, and stood upright in grooves, one board in front of the other, so that the ovals were identical. They were placed directly in front of the nozzles, then by moving one board slowly to the right, at the same time the other to the left, the oval opening was caused to shut the rays gradually in, until the opening was no larger than a pin's head, eventually closing entirely, finishing exactly in front of the centre of lens.

It is needless to say that when one lantern was shutting off, the other was acting reverse. This arrangement supplied all we wished for, and made a perfect dissolve. Very soon after, we used it in public with great success to exhibit our views and effects at the Adelphi Theatre, in conjunction with the scenic artist's work. There have been many dissolving arrangements since, but they have never surpassed, if equalled, our original oval opening.

The arrangement of being able to turn the lights up or down by means of one lever, also the curtain shutter, was first invented by Mr. Samuel Highley, a very clever and scientific gentleman. He, seeing such improvements were needed—set to work and accomplished them; being a friend of mine, he showed me his rough models. It may have been improved upon as to high class, mechanical arrangements, but the idea was certainly his.

Editorial Table.

TRANSPARENT COLOURS.—Messrs. Schwarz & Co., the wholesale agents for Brun's Glossy Transparent Colours, have sent for our acceptance a handsome case containing 24 bottles of these colours, for applying to photographic and lantern slides. We understand that prizes to the amount of Ten Pounds are to be given for the best work produced with these colours, and that for this purpose this amount has been sent to Mr. H. Snowden Ward, Editor of the *Practical Photographer*, Memorial Hall, Farringdon Street, E.C. For portrait painting two prizes (£5 5s. and £1 1s.) will be given, whilst the set of the three best coloured lantern slides will be awarded £2 2s. Several certificates will also be awarded. The competition closes February 25th, 1893.

We have received catalogues from E. G. Wood, 74, Cheapside, E.C.; W. L. Reed, 7, Westmorland Road, Newcastle-on-Tyne; S. & J. Mitchell, 17, Northgate, Blackburn, Manchester; F. V. A. Lloyd, 5, South John Street, Liverpool; Platt & Witte, Birbeck Road, Kingsland, N.E.; Newman & Guardia, 71, Farringdon Road, E.C.; W. Butcher & Son, Blackheath, S.E., W. B. Mitchell, & Co., 191, Hope Street, Glasgow; and J. W. McLellan, 36, St. Pauls Road, Canonbury, N. We regret that our space this issue will not permit of a comment upon them, but as these will be found of great interest, we would recommend our readers to send a post card with their address, for each, and carefully read for themselves.

—:o:—

Correspondence.

ELECTRIC LIGHT LANTERNS.

[To the Editor.]

SIR,—Your correspondent, M. Carlo Donati, is particularly severe on me, and having caught me napping, in using an expression in connection with the mention of dynamos, that was not properly descriptive, has hit out right and left.

No doubt he has the whole subject at his finger's end, and will be only too happy to enlighten your readers on a matter very little understood by lanternists. Should he not do so, I may, when I can find time, write more fully on this subject, and in such a way, I trust, as not to be open to his criticism.

I have been connected with, and manipulated optical lanterns, for a longer number of years than I like to count, mostly with the lime-light for the illuminant, but on several occasions have used the electric light. In the latter instances the responsible person in charge of the current relieved me from any anxiety beyond the manipulation of the lantern.

The more we know, we realize *how little we know*, and if your correspondent has nothing more to learn, he is in a more fortunate position than many of your readers, including—Yours, truly, SEARCH LIGHT.

PIN-HOLE PHOTOGRAPHY.

[To the Editor.]

DEAR SIR,—Perhaps your correspondent George Andrews might be glad to know that the subject of pin-hole photography is treated of at some length in "Sunshine," a book of lantern lectures recently published by Macmillan & Co.—Yours, &c., M. A. GRAY.

LETTERS AFTER NAME.

[To the Editor.]

ON the bills of a travelling showman who has just visited our town he had some letters after his name, I think M.L.S. or M.S.L. I think letters after a man's

name look learned-like, and if it is not very expensive I would like to pay a fee to be able to add some after mine. Will you kindly say whether I have to pay it to Government, and if so, can a tax collector give me receipt for same?—Yours truly,
TH. SHAW.

Many people add absurd letters after their names, but, if you send us 1s. 6d. per annum, you can, if you wish, place the letters S.O.M.L.J. after yours. This will do you as much good as any. They, being interpreted, would mean *Subscriber to the Optical Magic Lantern Journal*.

LIGHT GAS-BOTTLES.

[To the Editor.]

SIR,—Is not the craze for light Gas-bottles being carried too far? From a maker's price list I find that bottles of 4 inches diameter, charged to a pressure of 1880 lbs. per square inch, are made of steel of $\frac{1}{8}$ inch in thickness. This gives a bursting pressure 36,000 lbs. per square inch. Now taking the breaking stress of steel at, say, 120,000 lbs., this gives a factor of safety of $3\frac{1}{2}$. Locomotive boilers have, I believe, a factor of 6. It is true that the bottles are guaranteed as tested up to 4000 lbs., per square inch, but, for my own part, bearing in mind the rough usage, which bottles often get, I should prefer a greater factor, even at the cost of a few pounds extra in weight.—I am Sir, Yours truly,
LECTURER.

PHOTOGRAPHY WITHOUT A LENS.

[To the Editor.]

SIR,—Will you kindly permit us to inform your correspondent, Mr. Andrews, that to obtain pinhole photographs without distortion it is necessary to have a pinhole cleanly cut in metal, and that the distance from the pinhole to the sensitive plate is of the utmost importance to obtain the sharpest possible result—the distance varying with the size of pinhole used to fill a correctly corresponding area. The exposure is not nearly so long as is generally imagined: in good summer light, using rapid plate, say about 15 or 20 seconds.

It will interest lanternists to know that beautiful slides can be effected in this simple and inexpensive manner; copies of documents, engravings, letter-press, &c., can be made without focussing and without any lengthening out, as is necessary, but cannot always be done, with costly cameras.

We may add that if your correspondent desires to go into the matter scientifically, he should procure a French work on the subject, entitled "*La Photographie sans Objectif*," by R. Colson.—Yours truly,
Sutton. WORMALD & CO.

Notes and Queries.

Jos. Atkins says: I have two gas bags; they were very leaky, and I have just repaired them inside and out with India-rubber solution. Is there any danger in using them at once? *Answer*.—You are perfectly safe respecting the hydrogen, but before using oxygen bag, fill up with air and then empty it, do this for a number of times before charging with oxygen.

G. Bennet.—1, You are mistaken, the magnesium gives off smoke; probably you have reference to our articles "*Zirconia*" (November, 1891), or "*New Form of Incandescent Light*" (December, 1891). 2, We have never used a blow-through jet with ether saturator, but those who have claim that the light is *slightly* better than blow-through and coal-gas. 3, You will find matters simplified respecting attaching tubing to a gasalier, if you screw round one of the branches, so that when the tubing is sprung on, it will hang straight down. 4, Clarkson's or Beard's will suit you.

G. Kilburn.—We note your remarks about the article.

J. T. Mosedale asks us the following questions:—1, Give quantity of oxygen required for two hours show with single lantern and blow-through jet? 2, The same with a bi-unial lantern and blow-through jets? 3, Are single or bi-unial lanterns best for schools. 4, Will a camera front and bellows to lantern dispense with several sets of lenses? 5, Can I use gas from main, and oxygen from bottle? 6, Will the arrangement in No. 5 give a 12-ft. picture? 7, Do you advise several sets of lenses? 8, Can you recommend Beard's eclipse carrier? 9, Must I have different focus condensers for different focus lenses? 10, Can you recommend any special jet for single lantern? 11, Will mahogany or iron lantern be best? 12, What kind of limes must I use for a blow-through jet? To which we reply.—No. 1, About 10 feet. 2, About 14 feet. 3, Bi-unial, children look for effects occasionally. 4, No. 5, Yes, if you employ a blow-through jet. 6, Yes. 7, Better decide upon one. 8, Yes. 9, Not necessarily. 10, No, we must refer you to our advertisers. 11, Mahogany. 12, Soft limes.

W. S. enquires: 1, In an oil lantern with 4-inch condensers, how near should face of glass of lamp be to nearest face of condensers? 2, How near should face of slides be to front glass of condenser? *Reply*.—Move the lamp to and from the condenser until the best light is obtained. See article on page 153, on centring the light. 2, It is usually placed as near as practicable.

J. H. Baldock.—It is always desirable that the diameter of the objective be increased with the increase of focus, yet, some condensers are so constructed as to bring the rays forward to a comparatively small point, and in such cases a 2-inch objective would do very well. Try the front combination turned round, and move the light forward until the best result is obtained.

A. G. Drewry.—Yes, you can use the regulator mentioned for either gas.

Optic.—Kindly repeat queries, and gives us some idea of the experiment you wish to perform; you ask in one of your questions, what is the best colour for the purpose? but we do not know what the purpose is.

W. F. Jones.—Thanks, we had intended to be present but at the last moment found it impossible.

N.R., Jrs. Frith, Anxions, &c.—Your queries are all answered in one of the articles in this issue.

H. P. writes: I operate a lime-light lantern for a public lecturer, and will use the lantern nightly most of the winter, and I should like to know—1, Is it likely to injure my sight, and should I wear smoked glasses. 2, Can the same pressure gauge be used indiscriminately for both gases? 3, In what journal did you describe about the management of light? *Answers*.—1, It would not injure your sight, but if coloured glasses afford relief wear them. Is your lantern not provided with coloured peep-holes? 2, Suiter's or Clarkson's filled gauge can be used for either; you will find descriptions and illustrations of these in our issues for September, 1891, January, 1892. 3, See this journal for September, 1889.

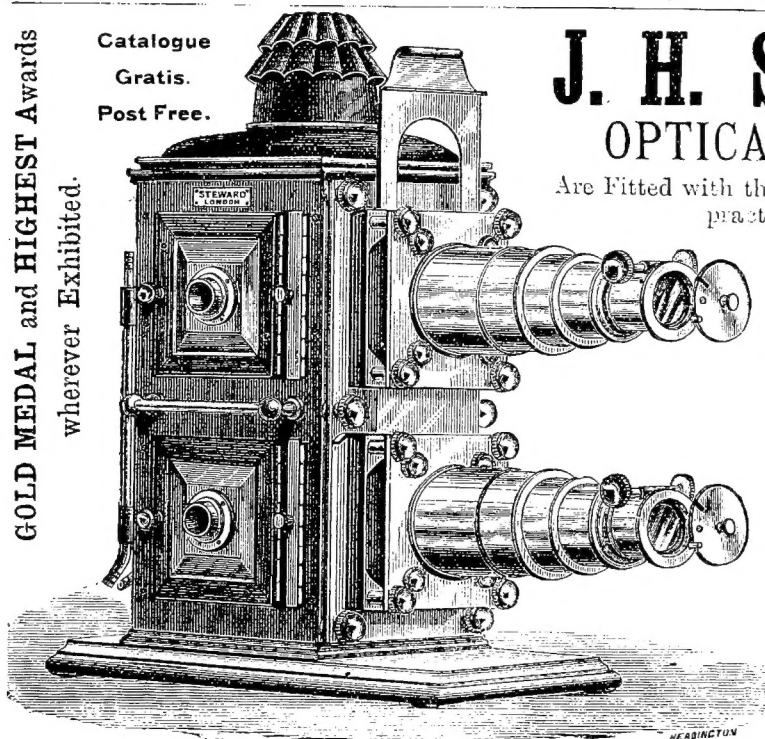
E. Baildon.—Your thanks were conveyed to the writer of the article on making lime cylinders. We cannot give addresses without permission.

M. A. Gray.—Thanks for the information, we have inserted it.

MESSRS. WORMALD & CO.'s, second "*Photominibus*" (Pin-hole) Competition was held on the 31st October. Over 150 prints were sent in. 1st prize, £2 2s., W. L. F. Wastell, Fuller's Road, South Woodford, Essex. 2nd prize, £1 1s., Henry Staynes, 41, Avenue Road, Clapton, N.E. (This competitor took the 1st prize in the previous competition). 3rd prize, 10s. 6d., Frank W. Robinson, 140, High Street, Lewis, Sussex.

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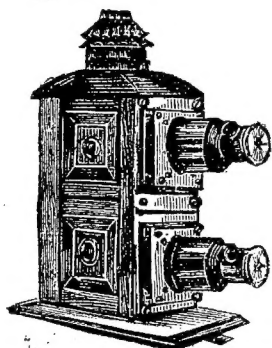
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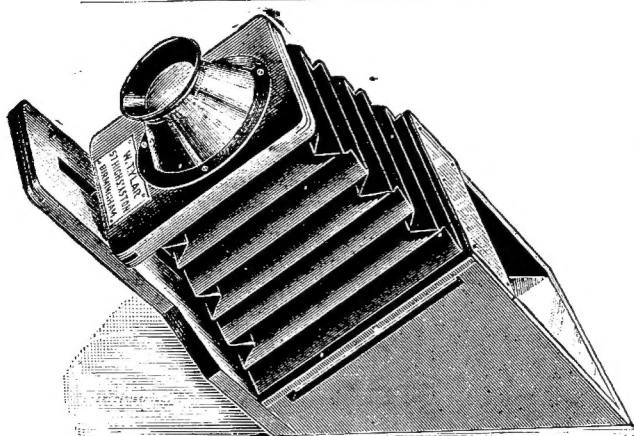
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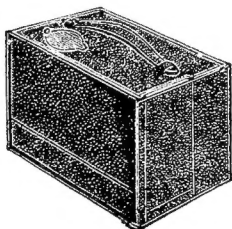
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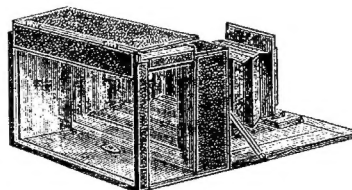
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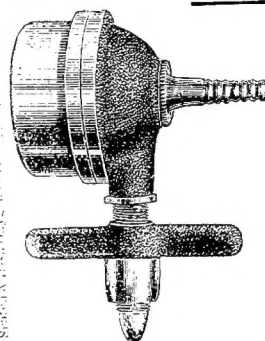
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